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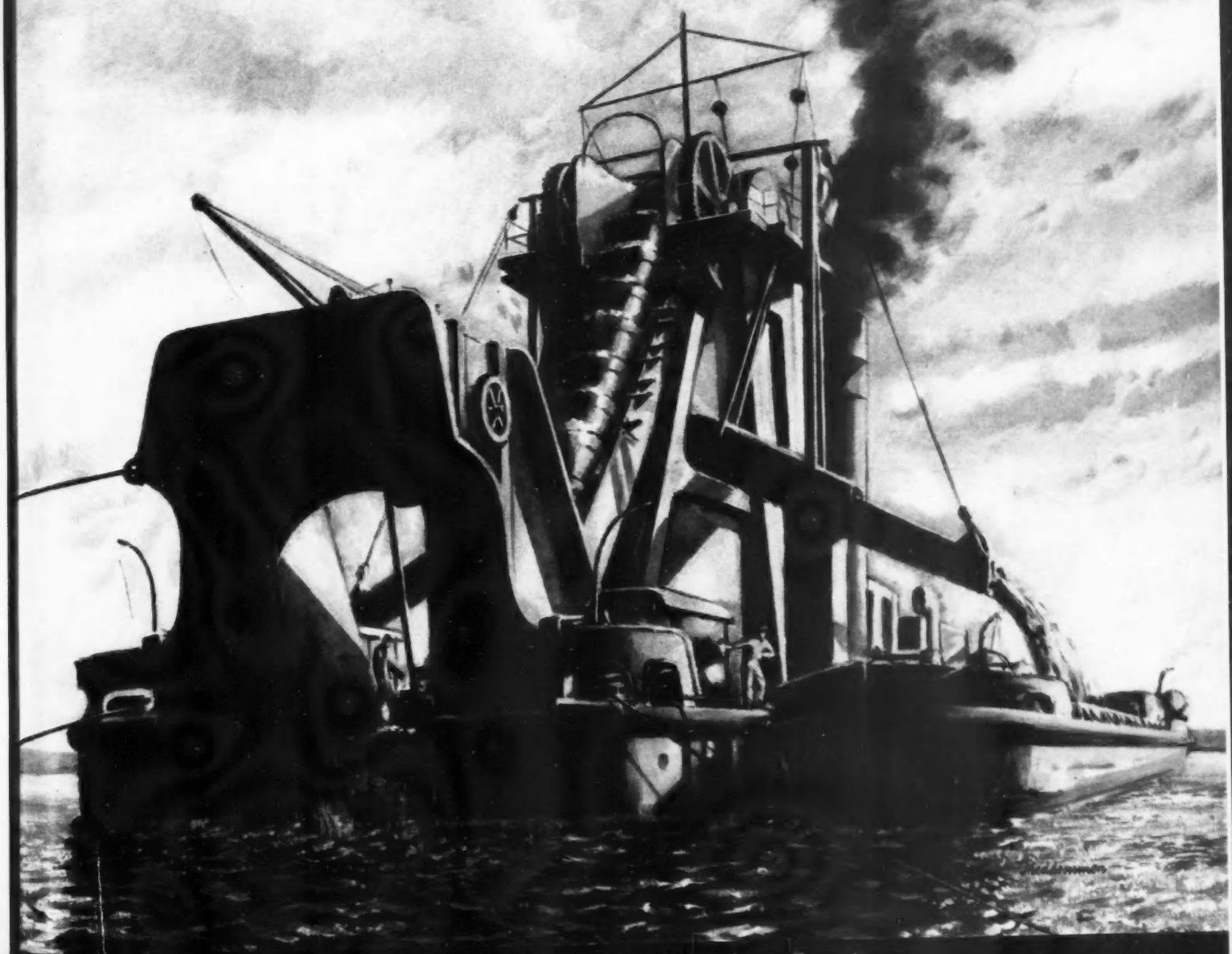
UNIVERSITY OF MICHIGAN
MAY 7 - 1954

No. 402. Vol. XXXIV. APRIL, 1954 Monthly 2s. 0d.



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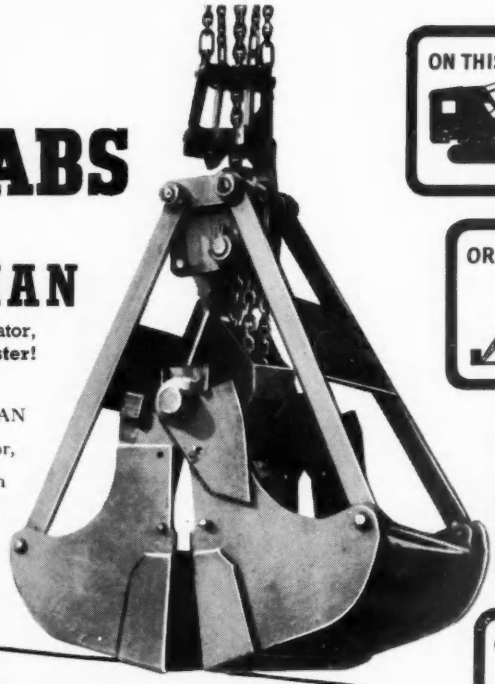

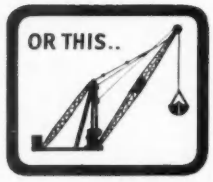

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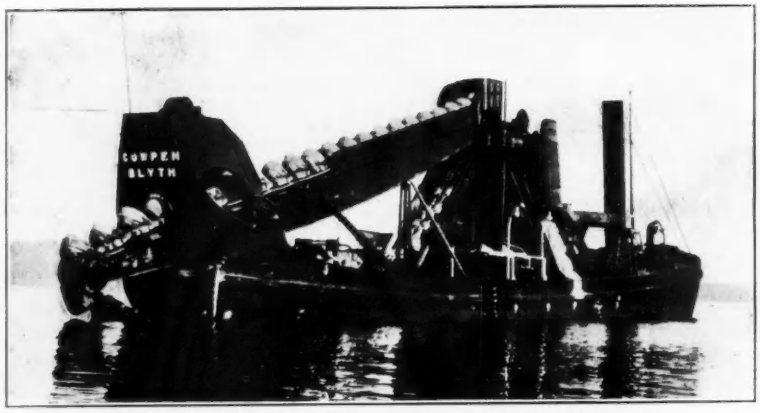

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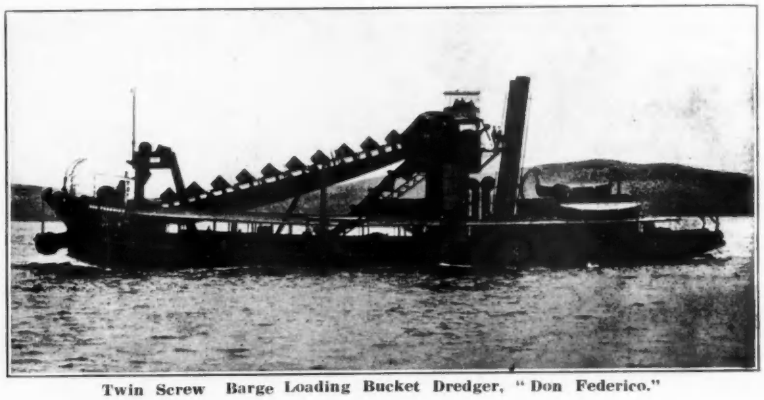

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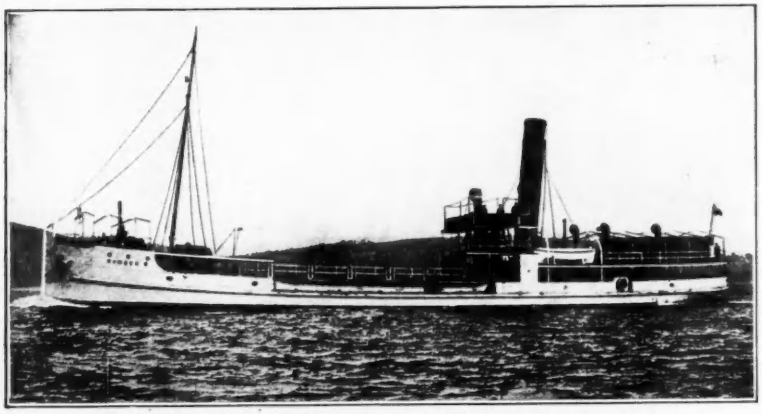

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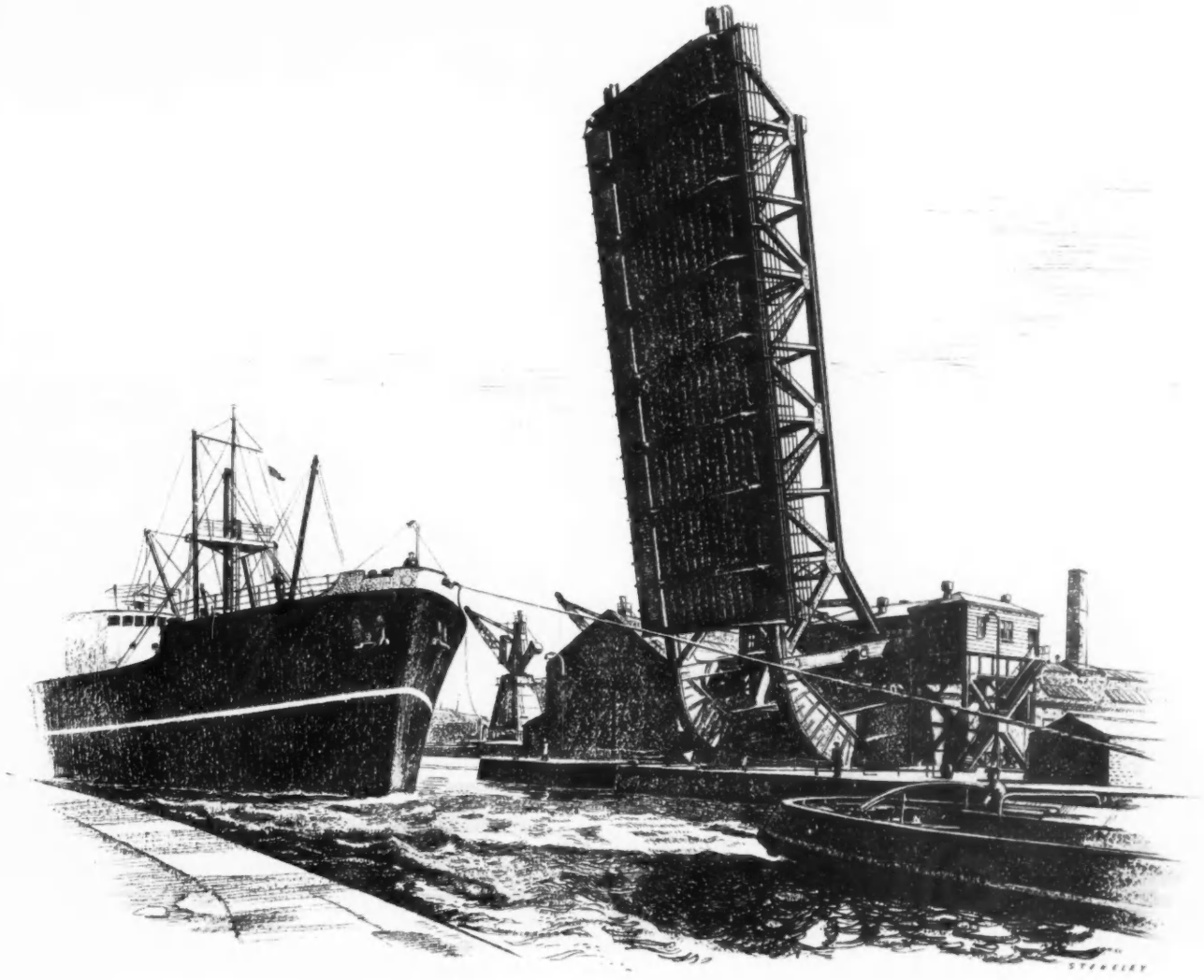

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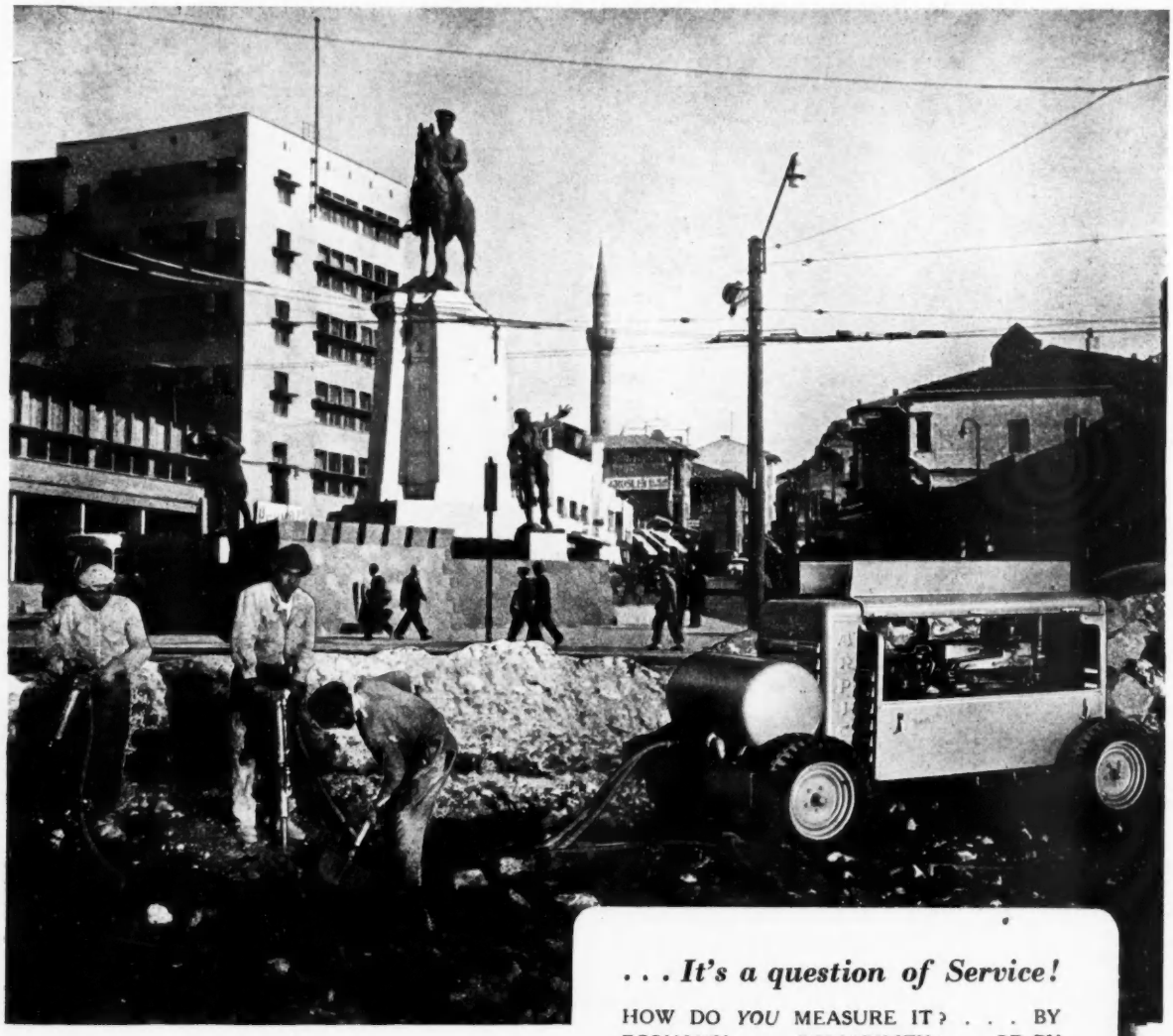

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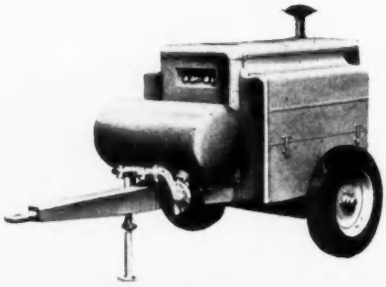

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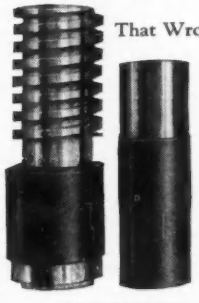

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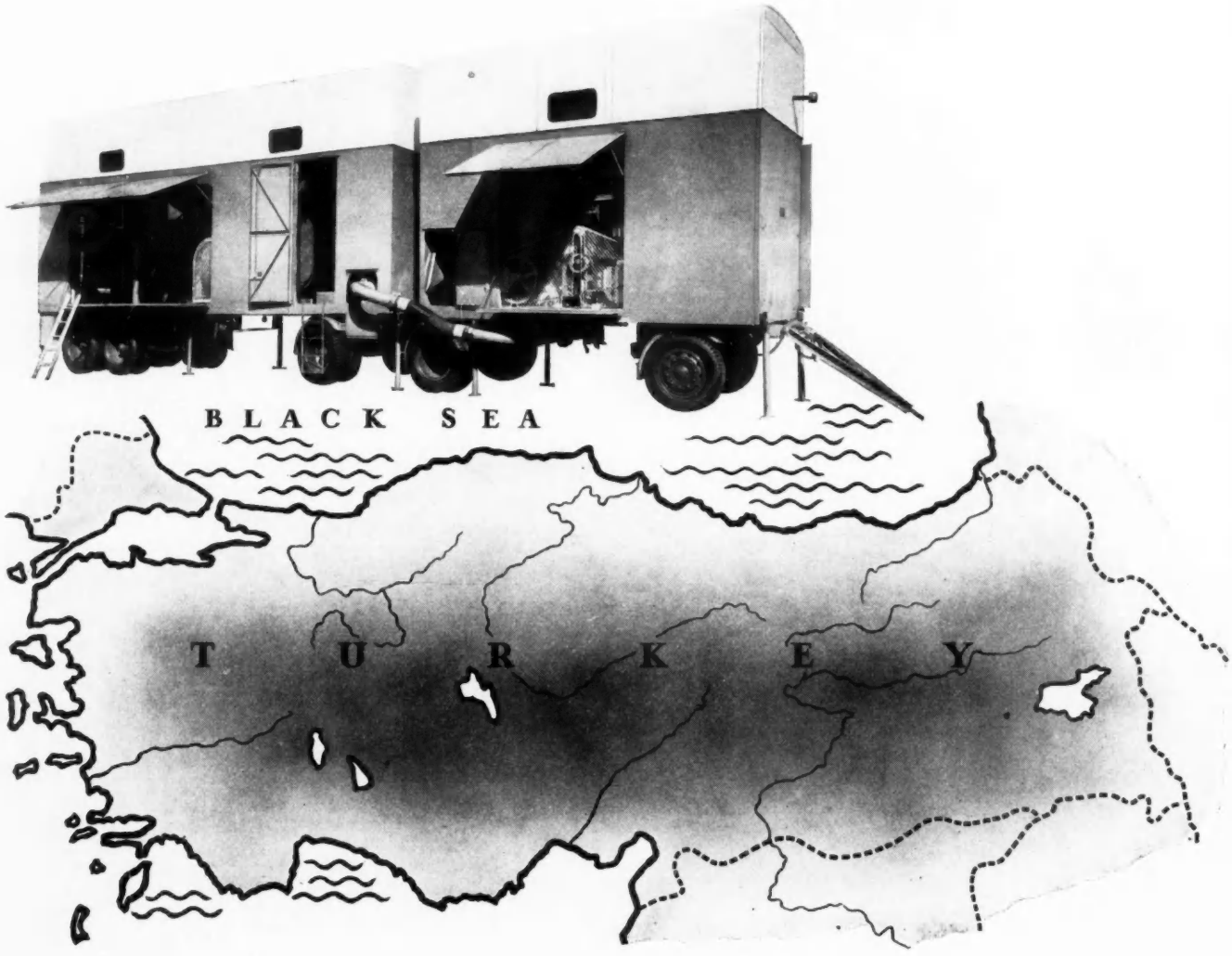

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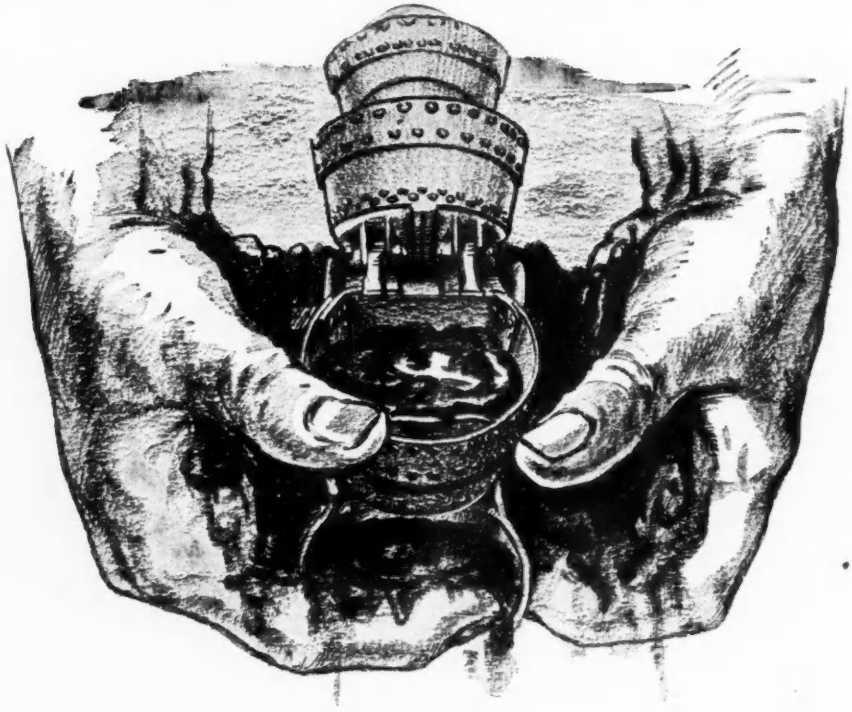

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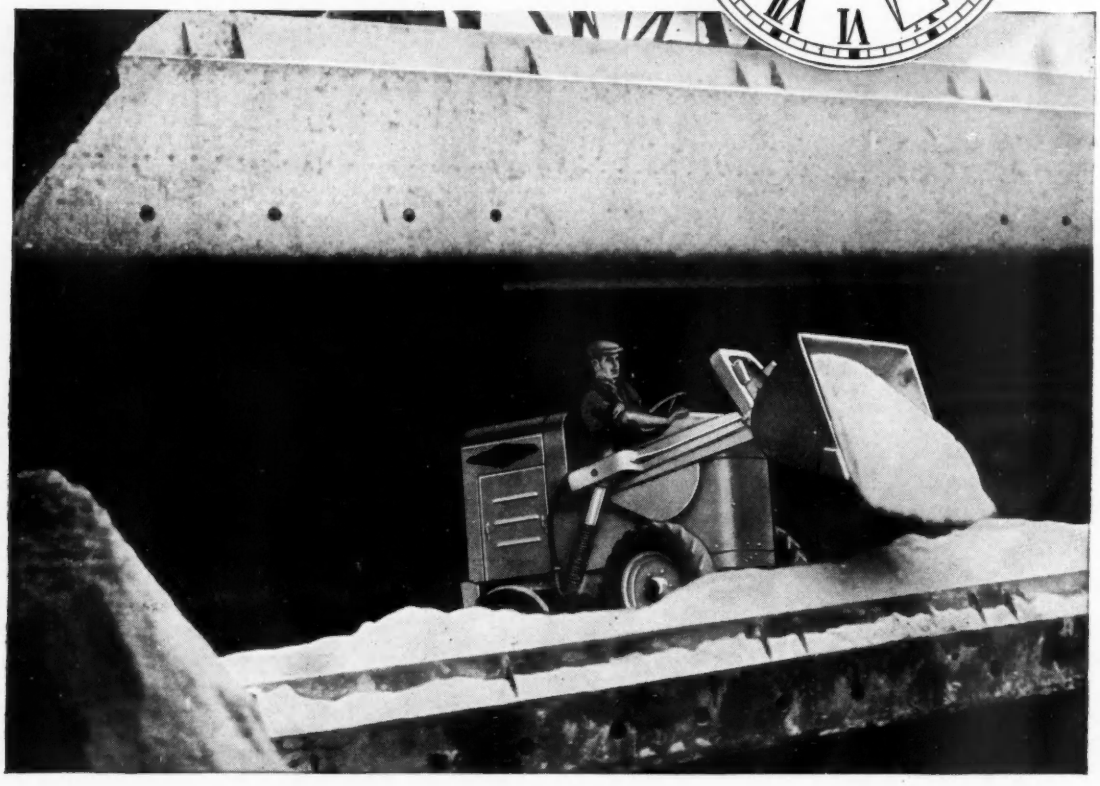

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No. 402

Vol. XXXIV.

APRIL, 1954

Monthly 2s. 0d.

Editorial Comments

The Port of Fleetwood.

Our leading article this month is devoted to the Port of Fleetwood, which takes its name from the family that for some centuries owned the land upon which the town is built. A hundred years ago the site consisted of an extensive area of desolate land covered with scrub and thickets and devoid of buildings. The considerable facilities afforded by the River Wyre for the establishment of a harbour and docks, and the advantages the locality derived from its proximity to the rapidly growing manufacturing districts in Lancashire, were realised by Sir Peter Hesketh Fleetwood, Baronet, who projected, and later laid out a small town with a landing quay.

Parliamentary powers to improve the natural harbour for the accommodation of shipping were given to the Preston and Wyre Railway Company in 1835. Two years later, the Company obtained the authority of Parliament to construct a dock. This concession, however, was not acted upon at that time, and in 1849 the undertaking was merged in the former Lancashire and Yorkshire and London and North-Western Railway Companies who were jointly interested.

The subsequent history of the Port of Fleetwood is briefly referred to in the article which follows on another page. It will be seen that the fishing industry rapidly grew to some importance at an early date, no doubt due to the increasing needs of the population of the many industrial centres which were established in the hinterland during the nineteenth century.

To-day Fleetwood, besides being a flourishing seaside resort and port, is one of the premier fishing centres of Great Britain. Fish forms an important item of the nation's food supplies, but it is one which rapidly deteriorates in both quality and freshness. Our readers, therefore, will examine with interest the description of the general handling of fish. This deals with all aspects of the routine practised to ensure each catch leaving the port in first class condition for human consumption.

Official Survey of English Canals.

An announcement by the Minister of Transport, made shortly after we went to press last month, may well prove to be the forerunner of a new, and we hope, realistic policy towards English inland waterways. This announcement, which has since been followed by the release of further details, was that a new survey is to be made of the inland waterways, to investigate whether all possible steps are being taken to ensure that the maximum economic advantage is being derived from the canal system under the control of the British Transport Commission. The Minister stated that the new Chairman of the Commission, Sir Brian Robertson, welcomed the proposed investigation.

The reasons for this decision are obscure. Possibly it was the result of a request of the Commission; or of the Ministry's very proper concern about the present state of the canal industry and the lack of any clear plans for its future; or it may have been in response to vociferant, if often ill-informed, demands for increased expenditure on the canal system as it now exists. No doubt the answer will become clear as the survey continues. In any case, it is to be hoped that the Commission will seize the opportunity to press for help in their dilemma over those canals with little or no commercial traffic, which have more than absorbed any profit made on their other navigations.

In a more recent announcement the British Transport Commission stated that the survey will be undertaken by Lord Rusholme, as representative of the Commission, together with Sir Rex Hodges and Mr. R. D. Brown as independent members. Lord Rusholme will bring to the deliberations his experience both on the Transport Commission since 1947 and as Chairman of the Coastal Shipping Advisory Committee. He has, more recently, been connected with the Road Haulage Disposal Board, but plans for the release from the responsibility for unremunerative waterways can hardly follow the pattern of the sale of road haulage units. Lord Rusholme can be expected to speak with intimate knowledge of the difficulties in achieving integration of transport resources (rail, road, canal and coastal shipping), of the problems of disposal, whilst the similarities of canal and coastal traffic are many. He will be ably supported by Sir Rex Hodges, the former General Manager and Secretary of the Mersey Docks and Harbour Board, and by Mr. R. D. Brown, the eminent civil engineer. Any proposal for the modernisation of a part of the canal system which at present can only accommodate boats of uneconomic size and incapable of operating in docks and tidal waters, must involve considerable engineering works. The extent of such works would vary, being less, for example, in the case of further improvements on the River Trent or the provision of a "waterhead" at Stourport on the River Severn, than for the enlargement or re-alignment of the existing Grand Union and Shropshire Union narrow-boat routes to the Midlands.

The Problem of the Redundant Canals.

The latest announcement also makes clear that the Board is specifically to make recommendations about the future of waterways which can no longer be put to economic use. This matter is fraught with difficulty; the Commission, who have quite clearly indicated which canals are now prosperous and which might more or less immediately be made so, have been struggling to find an escape from their difficulties with those of little commercial utility. The canals which fall into the latter category are well known; the only problem is what to do with them. It must be assumed that the Commission has been unsuccessful in its efforts to persuade local authorities or voluntary societies to accept them. Even the lowest level of maintenance to ensure safety against flooding risks and to accommodate the occasional pleasure boat, costs far more than any possible revenue from pleasure boats and any water rights. On the other hand, to extinguish them as navigations would be unwelcome and in many cases would involve considerable works. Furthermore in some cases, such as the Oxford Canal south of Napton, a limited amount of commercial traffic still passes, and to eliminate this would cause hardship to owners and crews of canal boats. At the same time anyone seriously interested in canal traffic must deplore the transfer of any waterborne traffic to road, since such a change must seem to portend the earlier extinction of the canals as a whole.

The only logical solution seems to lie along the lines of the

Editorial Comments—continued

transfer, with parliamentary authority if necessary, of these waterways to other authorities financed from public funds. Such a course would leave the Commission responsible only for those capable of commercial exploitation; then, if the capital expenditure for certain works of improvement were authorised, we might expect in a few years to find in England as healthy a canal industry as that on the Continent, even though it would not be comparable in extent. We believe that no single action would give more satisfaction and also provide a greater stimulus to efficiency, than the disposal of the redundant canals. So far, liability for them has had the stultifying effect that, despite every economy, the deficit on the canal accounts has been inevitable.

Oil Pollution of the Sea.

The problem of oil pollution of the sea has been frequently mentioned in past issues of this Journal. Our readers will, therefore, be interested to learn that an International Conference on Oil Pollution is expected to be held in London at the end of the present month. The subject is referred to elsewhere in this issue.

The Conference was recommended last year by the committee on the Prevention of Pollution of the Sea by Oil, set up by the British Minister of Transport, who announced in December last that he also accepted in principle the other recommendations of the committee. Some of them involve legislation, but this will not be introduced until after the International Conference.

It is to be hoped that the preliminary conference held in London in October will have stimulated public interest in the question of oil pollution of the sea, so that at the forthcoming International Conference those maritime countries whose shores have so far not been subjected to the effects of serious oil pollution, will signify their ratification of the Convention, when it is drawn up. It is only by international co-operation that this " intolerable nuisance " can be adequately dealt with and in due course entirely eliminated.

International Cargo Handling Problems.

Rising costs and the capital outlay necessary to-day to build and to bring into service a new cargo ship has made it increasingly imperative that all means should be used to ensure that the ship is earning revenue by carrying freight and is not spending undue idle time in port. Speedy turn-round is therefore essential and much thought is now being given by shipowners, stevedores and port authorities to increasing labour-aiding devices and to the introduction of special equipment wherever practicable.

It was with this end in view that the International Cargo Handling Co-ordination Association was formed, and it is due to this Association's initiative that international conferences have been held at which papers have been read and discussed. These conferences have enabled useful ideas and knowledge to be exchanged, based on the practical experience gained by its members in many phases of cargo handling. It is due, also, to the initiative of the Association that the College of Production Technology now includes a course on cargo handling in its curriculum, and that courses of lectures are given at various centres on this subject.

There is always a risk that such an organisation as the International Cargo Handling Co-ordination Association may start off with the best intentions but become an academic body paying little attention to realities. It would seem, however, that this danger point has been passed, for the Association is now receiving the recognition of port authorities from many different countries. It is noteworthy that, among the recent accessions to membership are the ports of New York, U.S.A., Toronto, Canada, and more recently Liverpool, England.

In March the Association held a Technical Conference in Paris, a report on which appears in this issue. A further Technical Convention is to be held in Italy, from May 31 to June 4 next, at the Palazzo dei Congressi, Naples, in the grounds of the International Maritime Exhibition.

Topical Notes

Dockers' Welfare Facilities.

Further details have now been made available concerning the International Labour Organisation meeting held in Geneva during February last, and briefly referred to in the March issue of this Journal.

In its conclusions on the subject of welfare facilities for dock workers, the Committee sai dthat such facilities should be considered a normal feature of a port. These would help to attract and retain the necessary manpower, to develop industrial and human relations in the docks, to reduce the incidence of ill health and the consequences of accidents and, as a result, to ensure higher productivity in the form of quicker turn-round of ships. Thus the effects of certain conditions which are inherent in dock works, such as irregularity of employment, irregular hours, waiting time, exposure to inclement weather, the handling of dangerous goods, etc., would be minimised.

The statement suggested various measures which might serve as guidance for the different countries, account being taken of their particular conditions. These measures concerned the study of existing welfare facilities and the responsibility for providing and operating them. It is strongly recommended that both the employers and workers organisations associate themselves with this important matter. The Committee also proposed certain principles for the following particular facilities: waiting and refreshment rooms, drinking water, facilities for washing, toilet and changing clothes, transport (which should be provided free of charge within the harbour) and protective clothing and equipment. The statement also dealt with first aid in case of accident (ambulance and boat always available), dispensaries and medical centres, and the rehabilitation of injured dockers.

Among other proposals approved by the Committee was that a regional tripartite conference should be convened, with a view to reaching an agreement establishing minimum labour standards for dockers in Continental North Sea ports.

It was suggested by the employer delegates that questions concerning " methods of increasing productivity of dockers " should be placed on the agenda for the next session. The workers' group recommended that further studies should be made concerning the " organisation of work and productivity in ports."

Mechanical Handling at the Port of Melbourne.

Over £300,000 have been invested by the Melbourne Harbour Trust Commissioners in their mobile equipment handling pool, which is available for hire to port users.

First established experimentally over 11 years ago, the pool now comprises about 70 fork-lift trucks, 40 mobile cranes, and an assortment of miscellaneous equipment including timber straddle trucks, bag stackers, low elevating tractors, front end loaders and mobile bucket elevators. Merchants, stevedoring organisations and carriers are encouraged to operate their own equipment, but the Trust's equipment is available to meet peak demand and for special requirements.

Mobile cranes include 3-ton, 5-ton and 10-ton types, as well as small hydraulic-tractor mounted models. Fork-lift trucks range from one to 6½ tons in capacity and include battery-driven types. They are frequently lifted into the holds of vessels to assist unloading.

Great importance is attached to maintenance, and the Trust's central workshops at Pigott Street, West Melbourne, are at present being extended to cover an area of 2½ acres. An adjoining garage can accommodate 200 units. Preventive maintenance is carried out continuously on the mobile cargo handling fleet by means of mobile service units based on the central workshops and equipped with air compressor and high-pressure lubrication system, by mobile repair units, equipped to handle minor defects, and by emergency motor cycle repair units. In addition, a mobile tanker cruises throughout the 20 square mile port area to refuel units twice daily.

The Port of Fleetwood

A Busy Lancashire Fishing Centre*

History.

FLEETWOOD is the most important fishing port on the West coast of Great Britain. It is in the county of Lancashire and is situated at the mouth of the River Wyre, which flows into the southerly end of Morecambe Bay.

In 1864 a private company known as the Fleetwood Docks Company obtained powers to construct two docks in the River Wyre to the southward of a natural harbour. The former Lancashire and Yorkshire and London and North-Western Railway Companies also were authorised to contribute jointly towards the capital of the Docks Company.

The work of constructing these docks was commenced by the Docks Company but, owing to its insolvency, constructional powers were transferred in 1871 to the Lancashire and Yorkshire Railway Company. That company completed one dock, now known as the "Wyre Dock," which shortly came into use for general shipping and for the fish industry.

In 1909 a second dock was constructed by the L. and Y. Railway Company connected with and immediately south of the Wyre Dock. This dock was specially laid out and equipped for the accommodation of the fleets of fishing vessels which during the previous few years had developed so much as to bring the port of Fleetwood into the position which it holds to-day in the fishing industry—premier fishing port on the West coast and fourth in order of importance in the United Kingdom.

The tidal harbour of Fleetwood for many years was used by the steamers of the railway companies on the Belfast service. Following the grouping of the United Kingdom railways, the London and North Western and Lancashire and Yorkshire Railway Companies joint interests in Fleetwood Harbour and the latter company's sole interests in Wyre Docks, passed to the London, Midland and Scottish Railway Company. In 1928, therefore, the Fleetwood-Belfast and Heysham - Belfast services were combined and the Fleetwood vessels were eventually transferred to and operated from Heysham Harbour. Since the nationalisation of the railways of Britain the Harbour and Docks of Fleetwood have been administered by the Docks and Inland Waterways Executive.

Description of the Port.

There is a depth of water on the sill of the harbour of 24-ft. 3-in. at Ordinary Spring Tides and 17-ft. 9-in. at Ordinary Neaps, the Spring rise being 27-ft. and the Neap rise 20-ft. 6-in., while the entrance to the docks is through a channel with a depth of 25-ft. at O.S.T.

The harbour is sheltered from all winds and run of tides. The port is well equipped with warehouses and there are three electric cranes lifting five tons and two lifting three tons at the berths.

For ship repairs and overhauls there is a modern triple slipway with a lifting power of 650 tons on the centre way and 600 tons on the side ways, and trawlers can be moved mechanically to side berths adjoining the cradle-way. The total number of slipways at the port is five, which includes one capable of dealing with a vessel of 1,050 tons d.w., and there is also a half-tide gridiron, 310-ft. by 50-ft., situated in the harbour.

As regards the docks, whilst an appreciable quantity of timber, chemicals and other traffic is handled, they are in the main devoted to the accommodation of the fishing industry. The entrance lock to the Wyre Dock is 250-ft. long and 50-ft. wide at quay level, the depth of water over the sill has been recently increased by 2-ft. 9-in. and is now 30-ft. at Spring Tides. The dimensions of the dock are 1,000-ft. long and 400-ft. wide enclosing an area of 10 acres, while there is 2,700-ft. of quayage. Sheds are provided on the quays for transit and storage of general cargo and quayside cranes include two of seven tons and three of four tons.

The Fish Dock is 12 acres in extent, the length of the fish quays being 2,000-ft., while the total length of quayage is 2,485-ft. An extensive covered fish market (Fig. 5) extends along three sides of the dock at which some 250 trawlers and fishing vessels can discharge their catches which are sold forthwith in the market and transferred direct therefrom to railway vehicles alongside, and thence by special services to all parts of the country, including London.

Situated on the dock estate is one of the largest ice factories in the country and there are engineering shops for all work necessary in connection with the maintenance of trawlers and other fishing vessels, together with factories dealing with fish offal and many other commercial undertakings ancillary to the fish industry.

Bunker coal is transferred in bulk from railway wagons to trawlers by means of recently installed electrically-operated coaling appliances of which there are three in each dock. Belt conveyors pass the coal direct from the wagons into the port and starboard sides of the vessel by means of delivery chutes of the "breeches" type. It is possible to coal large trawlers in less than two hours.

An Important Improvement.

With the post-war development of deep-sea fishing in Icelandic waters and the use of the docks by vessels of deeper draft, it became necessary to deepen the entrance of the Wyre Dock by lowering the sill by 2-ft. 9-in. as already mentioned.

This work was a notable achievement for it had to be carried out without interfering with the normal traffic to and from the Wyre Dock, for there was no possibility of permanently closing the entrance while reconstruction was proceeding. The scheme adopted involved the use of temporary steel gates that could be fitted at the outer and inner ends of the lock. These were floated into and out of position by means of pontoons, both for the removal of the two pairs of lock gates for the necessary increase in their depth and for the lowering of the sills (see Figs. 1 and 2).

Once the original lock gates had been removed for this purpose and the temporary gates fixed at high tide, electric and diesel pumps were used to empty the lock for the breaking out of the sill masonry to the required depth and the construction of the new sills. This work could be done only for a few hours while the tides allowed.

The fixing of the temporary gate for the removal of the inner lock gates necessitated the use of diving bell teams and two divers trained by Siebe, Gorman & Co. This gate was provided with penstocks for water levelling purposes. Both temporary gates were fabricated from steel sheet piling erected and welded on the site. They were raised into a vertical position and lowered into the water by means of two timber gantries erected on the quayside.

The contractors for the whole of the work were Messrs. Leonard Fairclough, Ltd., of Adlington, Lancs., and London. The design and supervision of the work were the responsibility of the Marine Engineering Section of the Dock staff.

The Handling of Fish.

Fleetwood and fish have almost become synonymous since the last war, for from 1939 to 1945 it became the centre of trawler fishing on the west coast, because the tradition fishing centres of Hull and Grimsby were virtually closed. While the east coast trawler firms and fish merchants that migrated west during that period have since returned, Fleetwood has maintained its importance as a modern fishing port and it may be of general interest to make more widely known the routine practised, in the public interest, relating to all the aspects of fish handling at this port, much of which devolves upon the Port Health Authority.

Trawler Crews and Their Living Conditions When Afloat.

The Corporation are, of course, the Port Health Authority, and are, therefore, empowered to execute certain port health duties, not the least of which is the sanitary condition of trawlers. It is essential that the quarters occupied by the crew are as comfortable as circumstances will permit. It is

*The portion of this article dealing with Fish Handling Routine is based upon excerpts from a paper by P. J. Fisher, Chief Sanitary Inspector of the Borough and Port of Fleetwood, read before the Royal Sanitary Institution, and reproduced by kind permission.

The Port of Fleetwood—*continued*

Fig. 1. Gate in position showing pumps at work.

also essential that the drinking water is pure. Ninety - four water samples were obtained from trawlers during 1952, of which 24 were unsatisfactory. The position is now satisfactory, as the trouble was traced to a water service, which was liable to intermittent contamination. Strict attention is paid to the sleeping quarters to insure that these are clean and free from vermin. The cooking facilities in the galley are regarded as of primary importance, and the utensils are closely scrutinised. The Health Department have received no reports of food poisoning or dysentry amongst trawler crews. This speaks highly of the ability of the cook, and the selection of the right type of person for this job.

Before leaving the question of feeding the crew, the trawler owner maintains a well-arranged food store, in order to supply his fishing fleet. All varieties of food are stocked, these being supplemented immediately prior to sailing, by the provision of bread, fresh meat and vegetables, sufficient being carried aboard to suffice for the whole trip. Bonded stores supply the necessary spirits and smokes for the use of the crew, under the strict control of the skipper and, of course, H.M. Customs Officers. It is pleasing to note the wonderful improvements which are incorporated in the new trawlers now being built, namely, water closets, baths and facilities for the rapid drying of wet clothing. Great is the interest aroused, when a brand new trawler arrives in port from the shipbuilders. It should be mentioned that a new trawler bears no resemblance in silhouette to the old traditional type of vessel, streamlining and covered-in superstructure strike one as being the main external features.

The trawler is commanded by the skipper, with the mate as second in command. The mate, who often holds a skipper's "ticket," is mainly responsible for the stowing of the fish, and its consequent quality when landed. He is usually to be seen in the vicinity of the landed fish until it has been inspected and sold.

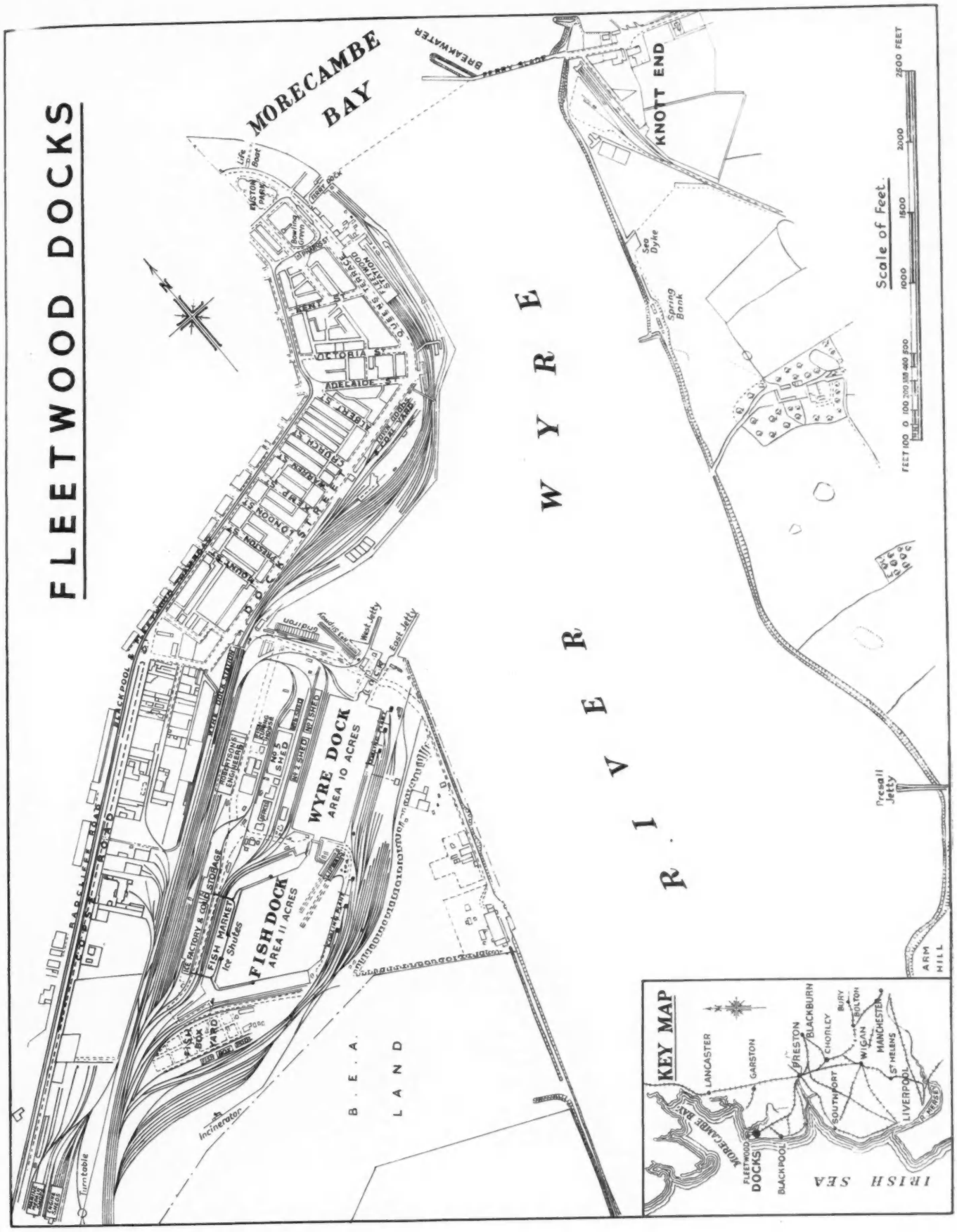
The skipper usually has a cabin for his sole use. The mate, chief engineer, radio operator occupy a cabin, and the deckhands, stokers and cook occupy the traditional forecastle. They all sleep in bunks when circumstances permit. Our fishermen form a very useful reserve, upon which the country relies when an emergency arises, and they provide the necessary personnel to man our minesweeping, etc., flotillas. Our fishermen cannot be spoken of too highly, they go to sea in all weathers, all the year round, in comparatively small ships. They go to relatively unfrequented distant waters, and occupy quarters which cannot be described as spacious; without question, a fine body of men.

The Trawler, and Treatment and Stowage of Fish.

The trawler is, of course, the largest type of fishing vessel, being specially designed for deep-sea fishing. It is built to withstand bad weather, and invariably contains powerful engines to drive through pack-ice often encountered in northern latitudes. Considerable deck space is provided forward in order to operate the fishing gear and hauling winches. In this space, the "landing," washing, sorting and gutting of the fish is carried on, after it has been hauled aboard. "Pounds" are arranged on deck to facilitate this work whilst fishing. The fish is then stowed in ice below deck, in the fishroom in separate pounds, which are provided with shelves, arranged in tiers. This prevents the fish from being subjected to maximum weights, when compared with, say, bulking, which causes rapid deterioration. This latter practice was, unfortunately, resorted to during the late war, when it became the policy of obtaining quantity. This did seriously affect quality, but it will be appreciated that the maximum use had to be made of the minimum storage space, owing to the reduced number of trawlers available for fishing. The consumer is entitled to a wholesome and well-kept commodity. The efficient gutting of the fish is highly important. If this is not properly done, it will expedite decomposition, rendering the fish unfit for human consumption. The livers are removed during gutting, and treated on board the trawler and the crude oil extracted. This contributes to a better quality oil than would result if the raw material were retained until returning to port. The proceeds of the sale of liver oil is, in most cases, a "perquisite" for the crew.

The Port Sanitary Inspector is naturally very interested in the method of construction of the fishroom. On the older type vessels the interior lining is constructed of wood, but on the new vessels it is polished steel, which, being impervious to soakage, facilitates cleansing. This naturally contributes to the wholesomeness of the fish stored therein. Although the question of the conditions obtaining in the fishroom is mainly the concern of the Port Fishery Officer, who is employed by the Ministry of Agriculture and Fisheries, it is of more than passing interest to the officer who will ultimately inspect the fish.

Fig. 2. Corner of Lock showing lowered sill and pintle.


FLEETWOOD Ddocks
MORECAMBE BAY
BREAKWATER
KNOTT END
RIVER WYRE
Scale of Feet.
2500 FEET
2000
1500
1000
500
FEET 100 0 100 200 300 400 500
Sea Dyke
Spring Bank
Presall Jetty
ARM HILL
WYRE DOCK
AREA 10 ACRES
FISH DOCK
AREA 11 ACRES
West Jetty
East Jetty
Station
Incinerator
Turntable
FISH MARKET
Ice Shutes
ICE FACTORY & COLD STORAGE
ROBERTSON ENGINEERS
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KEY MAP
LANCASTER
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PRESTON
BLACKBURN
CHORLEY
BURY
BOLTON
WIGAN
MANCHESTER
ST HELENS
SOUTHPORT
LIVERPOOL
MORECAMBE BAY
FLEETWOOD DOCKS
BLACKPOOL
IRISH SEA
B. E. A. LAND

The Port of Fleetwood – continued

In connection with the fishroom, it will be appropriate to consider the question of ice, with which the desired low temperature is secured. The trawler takes aboard from 20 to 30 tons of crushed ice, which is stored in the fishroom. Fig. 5 shows how this is done at Fleetwood, where the ice factory is conveniently situated. The ice is conveyed in large blocks by ingeniously contrived overhead conveyors, to five conveniently situated chutes. At the top of the chute is a crusher and, after crushing, the ice is delivered via the chute, which is flexible, directly into the fishroom or into merchants' receptacles for use when dispatching inland. There is, therefore, no handling or transportation involved.

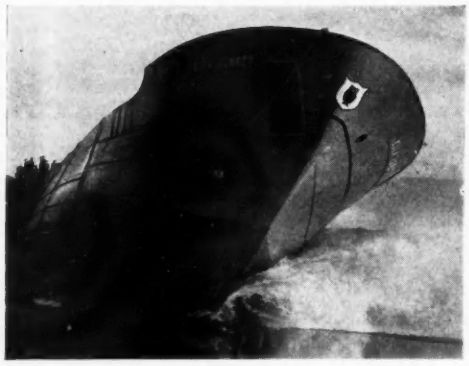

Fig. 3. Broadside launching of new Trawler.

Landing the Fish.

Before reaching port advance information is radioed to the trawler owner by the skipper, stating the amount and variety of fish caught. This is tabulated and made available to interested parties, by the merchants' association. On returning to port, the trawlers lie out to sea before entering the harbour, as they can only enter or leave the fish dock one hour before, until one hour after high tide. This practice of lying outside in deep water has an obvious advantage during hot weather, as the deeper water is much cooler than the dock water, which is relatively stagnant. Sea water can only be admitted to the dock when the dock gates are opened. The trawler, on entering the dock is berthed at the quayside, which adjoins the covered fish market. When ready for the actual landing she is berthed broadside on.

The landing operation presents a scene of great animation, but, of course, there is a certain necessary preparatory work to be done first. The deck level is below that of the quayside, and to overcome this, tall wooden trestles, known as "horses" are placed on deck. From the top of the "horse" to the quayside "drag" planks are placed. On the "jumper stay" between the funnel and foremast, pulley blocks, known as "gins," are fixed, directly over the hatchways. An electric power-winch raises the fish, contained in baskets, from the fishroom to the men on the planks, who drag the full baskets down the plank, to the sorting tables.

The fish are then sorted according to variety, and placed either in metal boxes, or "kits." The latter are tapered metal light tubs. Both are capable of holding 10 stones of fish, or 1¼ cwt. The boxes or kits are arranged in lots of 50. The men who are engaged on fish landing are known as "lumpers" and are expert at the job; the work is very arduous. In pre-war days the lumpers were mostly casually employed by the trawler owner, but now they come under the control of the Dock Labour Board, and have a guaranteed wage; they are directed by a foreman, or "charge hand," employed by the trawler owner.

The landing operation at Fleetwood usually commences at midnight and continues (with heavy landings of fish) until about 8 a.m.; with lighter landings the times vary from 2.30 a.m. to 4.30 a.m. It will be appreciated that the first fish to be landed has been exposed for some hours before it passes to the merchant for packing and re-icing[1]. Experiments have shown that fish rapidly rise in temperature from about 36°F. to 56°F. in about 90 minutes' exposure, out of the sun. Similarly, experiments have shown the cooling of fish when re-iced at[2] 56°F. for a period of about 160 minutes to 36°F. This point is mentioned to emphasise that such a perishable food should be maintained at the lowest possible temperature.

Fish Inspection.

The fish now exposed for sale, contained in boxes or kits, are ready for inspection. The inspector, who is suitably attired in protective clothing, must commence work about 7 a.m. in order to complete his inspections by 8 a.m., when the first sales are due to begin. He can get through in this time, provided all goes well and all the fish are good. If, however, any cargo or portion requires a more minute examination, then, of course, the cargo concerned is detained, and the inspector passes on to the next, having first placed detention tallies on the receptacles requiring further inspection. When the inspector has inspected all the good cargoes, he returns to the one detained for further examination. He selects a number of receptacles, in each lot of fifty, from the more stale-looking fish, and has the contents turned out—these he closely examines. This gives an indication of the condition of the whole lot. Every lot is treated similarly until the whole cargo has been inspected. This may mean from several hundred to several thousand kits. Occasionally, cargoes contain fish of mixed quality; these are ordered to be sorted. (This procedure is recommended by Ministry of Health Circular 2468, of 1941, para. 2.)

The good fish recovered are passed as fit for human consumption and the stale fish condemned. The general appearance and condition of a cargo of fish usually gives some indication to the inspector that a detailed inspection is justified. Cargoes of fish are rarely uniformly bad. It will be obvious to all that the stale fish will be that which has been longest caught, and that part of the cargo is landed last being, of course, at the bottom of the fish-room. The mixing of fish is usually due to want of care during landing, generally in the fish-room. The first to be landed is the last caught and is arranged at the top of the market. As the landing proceeds, the remainder is arranged in succession towards the bottom. It is the first-caught fish, arranged at the bottom of the market, that generally requires the most attention, particularly in the case of large cargoes, and from distant fishing grounds. There are, no doubt, instances where certain fish are quite sound at the time of inspection but, if delays occur in transit, may not be so fit on arrival at a distant destination. It will be appreciated that the inspector cannot make prophetic decisions, nor can he specify a short journey to a nearby market. He can only judge the quality at the time of inspection. The trade itself must take full responsibility as to whether the fish will be edible at the time of arrival at the inland destination.

The main condition looked for is staleness, which is usually due to the time elapsing between the fish being caught and landed; also whether the fish have been properly gutted, cleansed and stowed on the trawler. Further, whether the fish-room and pound boards were thoroughly clean, and whether there was sufficient ice used. Delays affecting the time lag are frequently caused by heavy weather, accident or breakdown at sea.

According to the Torry Research Station, Aberdeen, "Fish deteriorate or lose their freshness from two causes. The first cause is the natural change, called autolysis, which takes place after death. The second is bacteria, and it is important to note that these bacteria are present on the fish when caught only in negligible quantities. The rapid deterioration of fish as at present caught and landed commercially, is due to the bacteria with which they become infected during gutting and stowing."

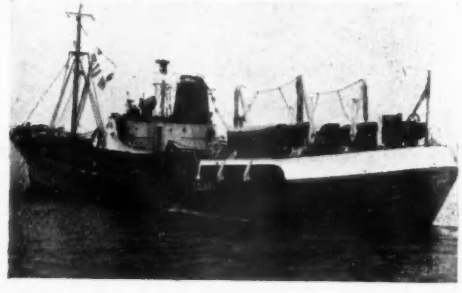

Fig. 4. S.T. *Ella Hewell* a recent addition to the fishing fleet at Fleetwood.

Fish is not condemned by reason of its bad appearance alone; regard is paid to the following general points.

The flesh should not be discoloured, and should be reasonably firm (although there exist certain naturally soft-fleshed fish, such as hake, ling and catfish). The congealed blood content of the large blood vessel exposed in the abdominal cavity should not become liquefied. There should be no decomposing gut present, the membrane should not be easily removed, the eyes should protrude, the gills should be fresh in appearance. The wholesome smell of the sea will not be present in stale fish. There are certain fish, such as skate and dogfish, which naturally possess a peculiar ammoniacal odour; this should not be confused with unsoundness.

The Port of Fleetwood—continued

There are, of course, conditions to look for other than staleness, such as tumours and parasites. Tumours, very rarely seen, are usually indicated by abnormal swellings and may be accompanied by emaciation. They may be of a hard, fibrous nature, or have soft centres, and affect large halibut and skate; with respect to parasites, the most common is Filaria bicolar, found in the musculature of cod during filleting; these are harmless to man. A small wire-worm may sometimes be seen embedded in the nape of gurnards; these were identified as Ascaris capsularis, and are also harmless to man. It would be remiss not to mention the large-headed tape-worm, Bothriocephalus latus; this cestode is communicable to man, but is very rarely encountered. In the event of particularly unusual specimens being found, these are forwarded to a research station, where assistance is readily given. All condemned or unsold fish, together with the offal, is sent to the local fishmeal works, where it is converted into animal feeding stuffs, or fertilisers.

Fish Packing and Transportation.

After the fish has been purchased by the merchant, he removes it to his "stand" for packing. Most round fish such as cod, are beheaded, in order to conserve space in the boxes (although not infrequently, this may be done at sea). Certain customers may require their fish filleting; both these processes, when carried out at the port, have the advantage of causing the offal or residue to be retained, where it can be easily disposed of for fish meal. The fish is packed into five-stone boxes (which are returnable to the port), together with a liberal quantity of ice, and consigned to the inland merchant. It is a great convenience nowadays, for the port merchant to participate in a box pool scheme, through the local merchants' association. This provides for the manufacture and repair of fish boxes which, on return, are examined and again made ready for use; the merchants now need no private box stores of their own. The fish, when packed and iced, is placed on rail in insulated fish vans.

The usual method of fish packing is to cover the bottom of the clean box with a layer of broken ice, lay the fish head to tail, cover with ice, and repeat the process until the box contains five stones of fish. The inside of the box should be lined with clean white paper. The quantity of ice used is about 25 per cent. of the weight of fish.

Fleetwood is well served as regards railway facilities, as the loading bay is conveniently situated and forms part of the fish market; this conduces to the rapid handling of fish from the merchant's stand to the railway loading bay. The merchant usually receives his fish about 8.30 a.m., and the first train leaves about 2.30 p.m. for London and the south. Other trains follow at intervals, according to the amount of fish available for dispatch. Reverting to the question of fish boxes, it is questionable whether wood, being liable to soakage and difficult to cleanse, is entirely suitable. The inland merchant very often offends by returning the boxes in a filthy condition, and not infrequently one sees boxes returned containing the viscera and feathers of poultry; these, of course, are rejected as unfit for further use. The inland merchant could co-operate by cleansing his boxes before returning them to the sender. Since the new Clean Food Bylaws have been in operation, there has been a notable improvement in the condition of returnable fish boxes. There is, however, considerable evidence to show that boxes returned from large inland markets are not cleansed as they should be.

Disposal of Condemned Fish and Offal.

The proprietors of the local fish meal and oil works provide the containers for all offal and unsold fish, together with labour and transport, for conveyance from the market to the works. During hot weather, when there are usually large quantities for disposal, a problem is created.

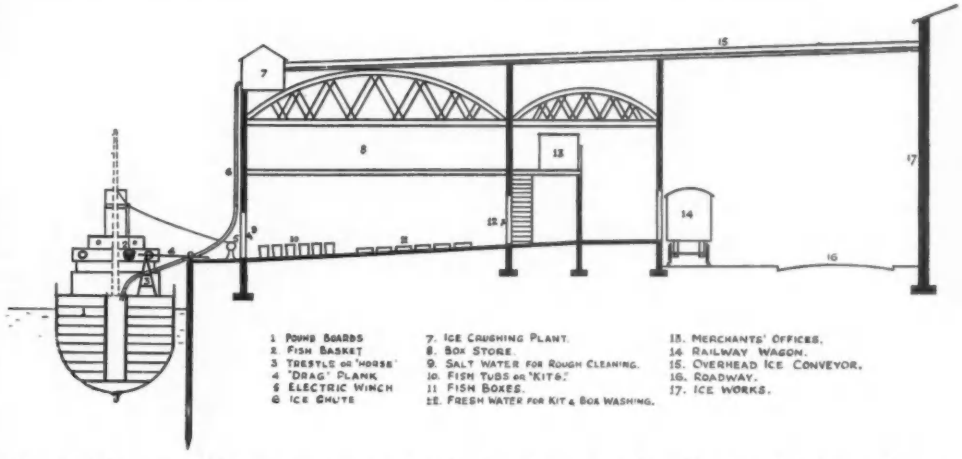

Fig. 5. Fleetwood Fish Docks. Cross-section showing Trawler at Quayside, Landing Stage, Market, Railway Siding and Ice Works with Overhead Conveyor.

The material is converted into meal for animal food and fertilisers, and the oil is extracted. The process mainly consists of treatment in steam-jacketed sterilisers, where it is subjected to about four hours' steaming, after which it is dried and ground into fine meal. The oil is extractable meanwhile. During this process, gases are produced, the soluble being condensed with fine water sprays, and the insoluble with both water and chlorine. This latter treatment does, however, add considerably to the manufacturing costs, but is necessary to prevent nuisance from atmospheric pollution.

It is extremely difficult to combine the incidental work of a busy fishing port with the requirements of a seaside holiday resort. Fleetwood contains both these features and copes with both successfully.

Fish Processing.

The processing of fish is an important sideline at a fishing port, the main processes being, the conservation of fish by curing or smoking, salting and drying, and, of course, by quick freezing or deep freezing. The dried fish is mainly for export, and entails a considerable amount of work throughout the whole process, which extends to several weeks. Owing to the high costs involved in this process, the salter can only purchase his supplies of wet fish when the prices are at "rock bottom." The fish mainly used for drying and salting are saithe, cod and, occasionally, ling. According to the Annual Report of the White Fish Authority for 1951, the export figures for that year were 11.569 tons of salted and smoked fish.

Certain types of fresh fish are often filleted before dispatch inland — this enables the finished product to be immediately available for cooking on its arrival.

Since the late war ended, the quick freezing and deep freezing methods have come much to the fore, and many large firms have installed the necessary plant. There is, unfortunately, a certain amount of trade and consumer prejudice to be overcome before this frozen product becomes generally accepted. Many of us recall a similar prejudice against the pasteurisation of milk, and now we find that, with the passage of time, it has become an acceptable commodity. According to the White Fish Authority Annual Report for 1951, the consumption of frozen fish in this country is "probably not more than four per cent." There is certainly room for considerable expansion in this connection.

Fish Supplies, Etc.

It would be appropriate to refer briefly to the question of fish supplies and marketing. Although this is the chief concern of the fish trade generally, it is a matter which is of interest to the port health inspector. He frequently sees considerable quantities of good, wholesome fish sent to the fishmeal works, particularly during the summer period, when supply exceeds demand and prices slump. During winter, when supplies are scarce, mainly owing to bad weather, prices rise. Surely it should be possible to relate supply and demand a little more closely. Some of us may recall the serious state of the Milk Industry in the early 1930's, when the dairy farmer had a very raw deal. We then saw the creation of the Milk Marketing Board, and the wonderful improvement that ensued. Can the same ideas be applied to the fishing industry? Many consider that they can. Those

The Port of Fleetwood—continued

directly concerned viewed with interest the institution of the White Fish Authority in early 1951. It is too early yet to expect results, but they have lost no time in getting together all the interests concerned. The Authority was wise in its selection of a headquarters in the West Riding at Knaresborough. This indicates a neutral position midway between the east- and west-coast ports. Judging from the contents of their first annual report for the period ending March 31st, 1952, they certainly have got to grips with the problem, sparing no pains to secure information and facts. They have surveyed the whole of the fishing resources in a businesslike manner. It is pleasing to note that they have recognised the value of the Department of Scientific and Industrial Research, and have referred to them the question of " the development of an efficient method of freezing fish at sea with a view to raising the quality of fish landed." The Department is also dealing with the " problem of perfecting a test for quality which can be easily and rapidly applied to fish on landing."

Colleagues from other large fishing ports may consider that there is only one method of ascertaining the quality of fish when landed, i.e. the test should be practical, by an inspector of long experience.

There is only one criticism which it is ventured to make, regarding the White Fish Authority, and that is that the Advisory Council, as outlined in Appendix I of the Report, is too large and unwieldy. The producing and consuming sections are so vastly outnumbered by the intermediary sections that this must inevitably retard progress. Again, there are no representatives from the Port Health Authorities, nor from those humble but conscientious officers, the Port Health Inspectors, who, on behalf of the consumers, inspect the fish. However, we sincerely wish the Authority well, and are sufficiently optimistic to expect something of benefit, to the trade and public, to emerge in the not-too-distant future.

Other Duties.

(a) Public Health (Shellfish) Regulations.

The inspector is largely responsible for the administration of these regulations. In the event of the layings or beds being liable to faecal pollution, he must be on the alert, and take frequent samples of the shellfish to ascertain the purity. Where the beds are closed by Ministry of Health Order, he must see that the duly authorised prohibition notices are posted, in order to warn the unwary gatherer.

(b) Inspection of Fishing Vessels.

The inspection of the quarters occupied by the crew is an important duty, attention being given to the purity of water and cleanliness of storage tank, the provision of sanitary accommodation, the cleanliness of bunks and bedding, including freedom from vermin, the condition of living quarters generally, and suitability of food storage, whether " proofed " against rats, and the prevention of rat infestation.

(c) General Inspection.

The general cleanliness of the market, including the daily removal of offal, is insisted upon; also the cleanliness of all utensils and implements coming into contact with fish. The inspector must see that dock water is used only for the cleansing of the floors and paved surfaces of the market and surroundings. He must pay regular visits to the curing and salting houses, to see that sanitary conditions prevail.

REFERENCES.

[1]Department of Scientific and Industrial Research, Food Investigation Leaflet No. 3. " The Care of Trawlers' Fish," by G. A. Reay and J. M. Shewan (Torry Research Station).

[2]and Department of Scientific and Industrial Research, Investigation Board, Special Report No. 25. " The Handling and Transport of Fish," by Griffiths and Heron.

Book Reviews

" Report of Hanoverian Research of Civil Engineering Construction of Franzius Institute." Vol. 4, 175 pp. with many diagrams and photographs. Published by Franzius Institute der Technischen Hochschule, Hanover.

The fourth annual volume of the Proceedings of the Engineering Research gathering at the Franzius Institute, Hanover, for the year 1953 has four papers of particular interest.

Mr. G. Jarlan, of Havre, gives a review of several of the Engineering problems encountered in the repairs and reconstructions of the war damaged harbour of Le Havre, and a short paper describing the training of Civil Engineers in France. There is also a highly technical study of the entrainment of air in flowing water, cavitation, etc., and the design of spillways and sluices by Dr. D. Dettmers.

A very useful and instructive reduced model research into the improvement of the America dock at Cuxhaven by Professor Henson, the principal of the Institute, is described by him with convincing clarity. The main features of his conclusions are:

(a) the streamlining of the tidal flow and ebb about the harbour projection into the existing channel by the use of groynes;

(b) the closing up of the existing entrance, facing north-east, and lying almost central in the outer mole aligned N.W. to S.E., and the removal of a re-entrant spur into the harbour from the existing entrance head of the old eastern arm;

(c) the opening up of a new entrance facing almost east through the eastern arm from the elbow of the existing outer wall for about 700-ft. shorewards;

(d) the provision of an artificial spending beach about 700-ft. long and 350-ft. wide running almost normal to the proposed harbour entrance, rooted in the new eastern entrance head to the west and terminating upstream in the concave flank of a massive curved groyne, which forms part of the groyne system.

The model results for this solution were most favourable for harbour quietness and navigation. The paper is generously supplied with photographs and diagrams of the tests.

Another paper by Dr. Kurt Helm and Captain Moeckel gives a great deal of useful data from experimental results of canal cross-sectional profiles related to the form of vessels employed.

R. R. M.

Kempe's Engineer's Year Book, 1954 (59th edition). Two volumes (crown 8 vo.). 75/- plus postage 2/6. Morgan Brothers (Publishers), Ltd., 28, Essex Street, London.

The 1954 edition of this well known and deservedly popular reference book, covering theory and practice in all branches of engineering, has been entirely rewritten and reset in a clearer type face.

Each chapter has received the attention of an eminent authority and much new information has been added. There are also eight new chapters: Atomic Power, Explosives, Electrical Engineering Fundamentals, Industrial Safety, Mechanical Handling, Plastics, Powder Metallurgy, Theory of Structures. In all there are 79 chapters and it is observed that information, which with the passage of time tends to become out of date, has been now entirely eliminated from the latest edition. Much additional matter has been introduced, so that many of the existing chapters are virtually new.

It is also worthy of note that a certain amount of repetition and dispersal of data which was noticeable in the older editions of this work has been eliminated.

It is now possible to be more reasonably certain that one will find, under one chapter, all the information and data on any particular subject. As an example, " Marine Oil Engines " and " Marine Steam Engines " have been combined in " Marine Engines ". At the same time, it seems that still further improvement could be effected by a more connatural grouping and sequence of chapters.

As a reference book, " Kempes " has for long been unique in the extraordinarily wide range of subjects which it covers so concisely. This latest edition widens that range still further and is an up-to-date and authoritative book which should be on every engineer's shelf.

H. F. C.

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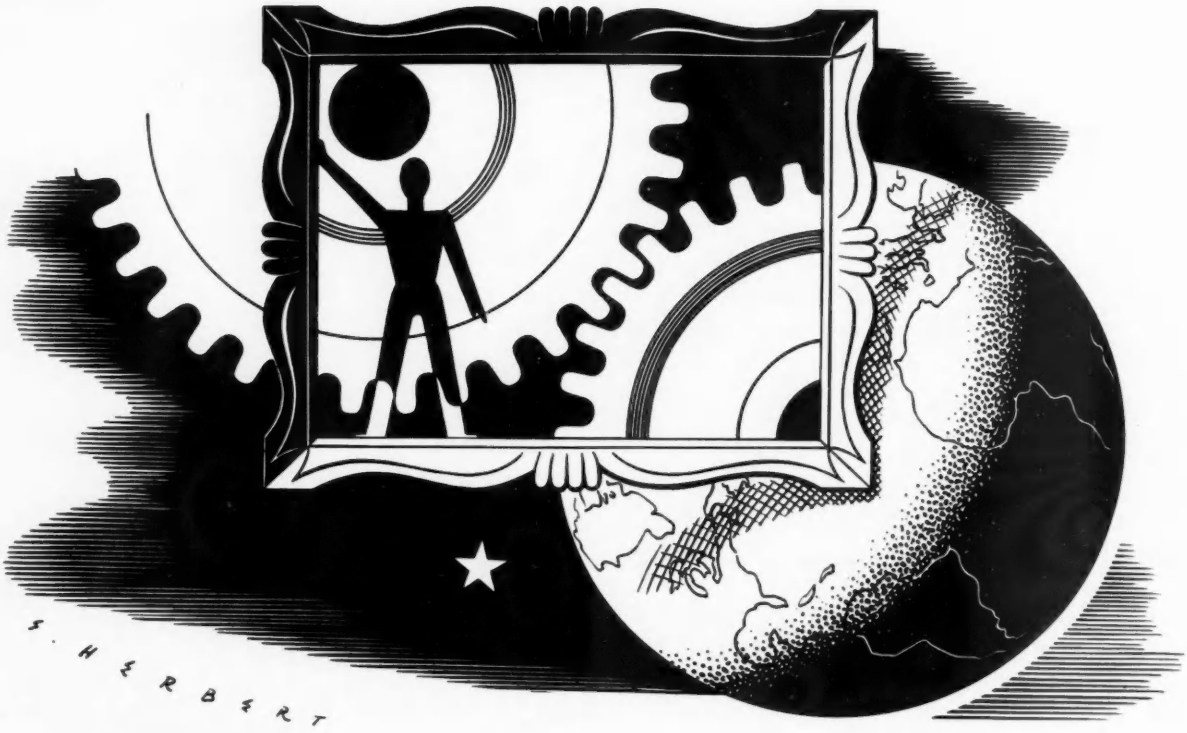

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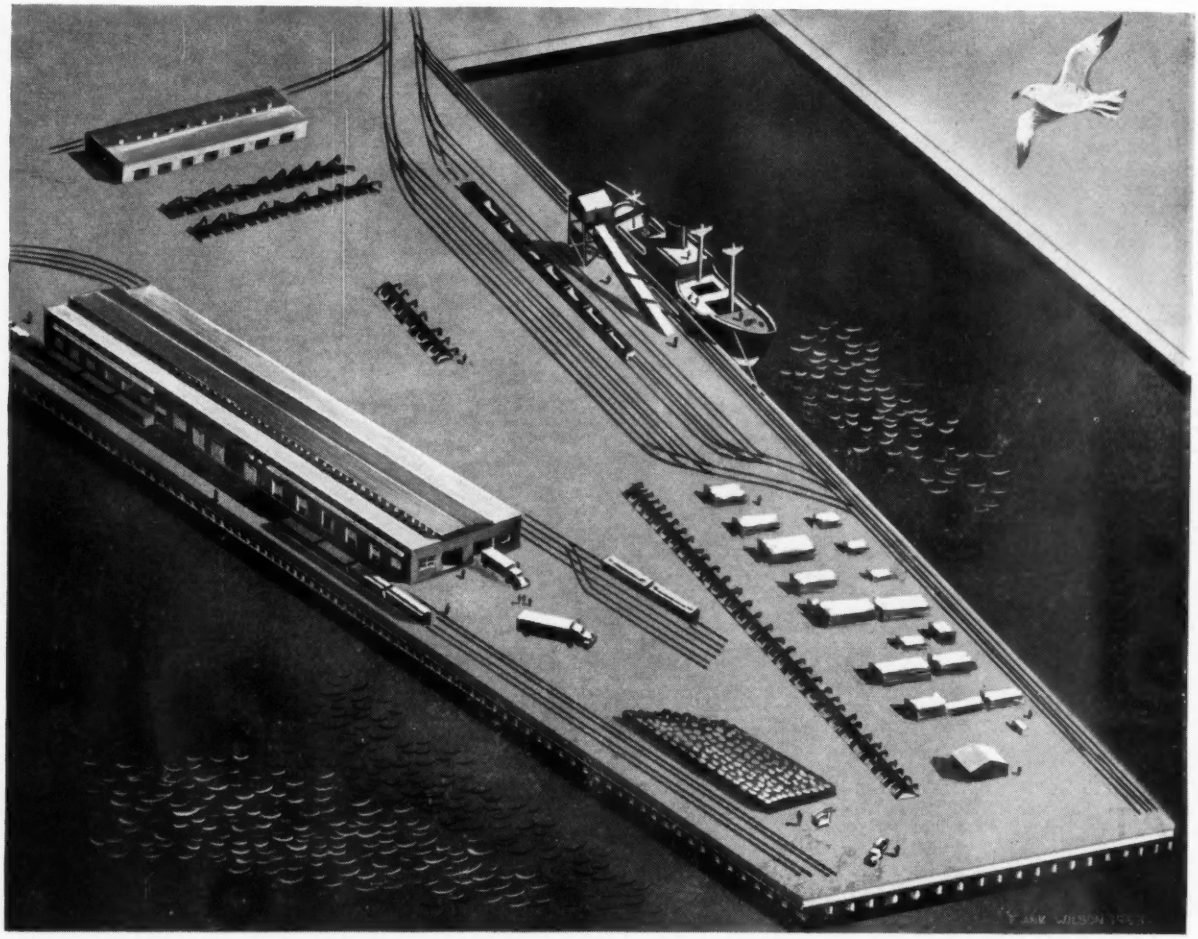

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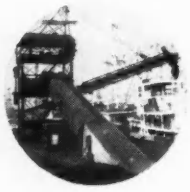

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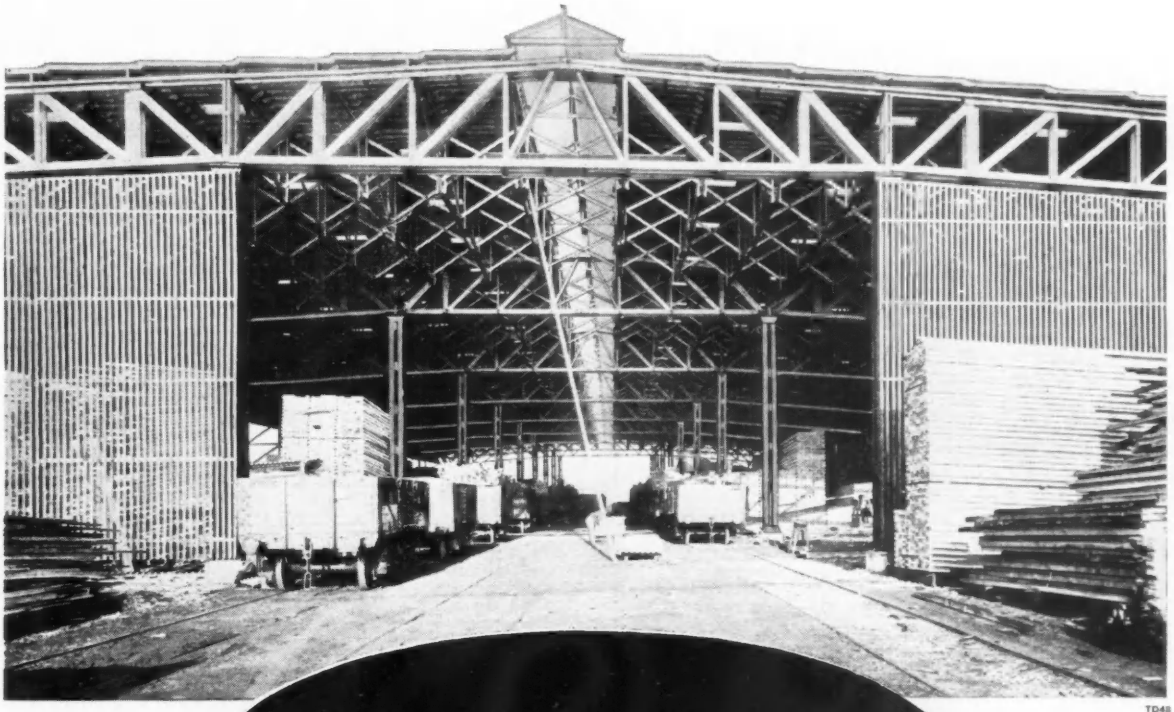

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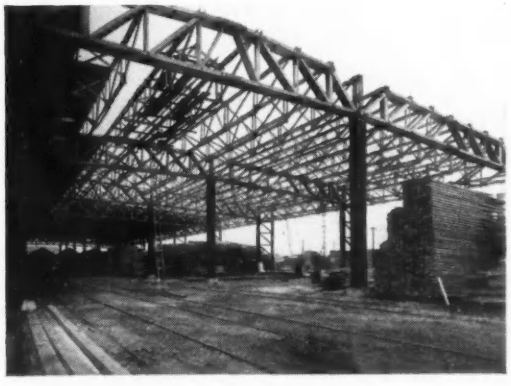

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The Supply of Electricity to Shipping

System Adopted by New Zealand Harbour Boards

By T. G. PROCTER, A.M.I.E.E., M.N.Z.I.E.

THE AUCKLAND HARBOUR BOARD has, in common with other New Zealand Harbour Boards, installed an electrical system at all its berths for supplying electricity to coastal vessels so that engine room staffs can be relieved from watchkeeping duties while in port. The system is a " standard " system, and is similar to one established in Australia, although the two schemes differ in detail. Most cargo vessels in the regular trans-Tasman trade are, therefore, able to take electrical power from the shore in the different ports between which they operate.

While the shore supply was intended only for ships' domestic electrical requirements, owners of some small vessels have found it to be of advantage to arrange matters so that the shore supply is also used for cargo winches. Fig. 1 shows the supply being used in this way. This photograph was taken at the small port of Onehunga on the Manukau Harbour, which, together with the Port of Auckland on the Waitemata Harbour, comprise the ports operated by the Auckland Harbour Board.

At Auckland, prior to the installation of the electrical system for coastal shipping, which is an alternating current power system, the only electrical power available on the wharves was direct current. This had been a handicap to repair firms whose plant required an alternating current supply. The amount of electricity required for repair purposes at cargo berths was insufficient alone to justify a new electrical system, but its advent for another reason has made a very welcome addition to the port facilities.

In what follows, the standard scheme and its operation will be described in some detail, and the article will conclude with a short description of shore-supplied portable lighting provided aboard ships for cargo working.

Standard Scheme.

A technical committee convened by the Marine Department on behalf of the Government studied shipping to be supplied, and evolved a scheme. This is simple and technically satisfactory, but some administrative difficulties, to which reference will be made, have been experienced.

The New Zealand standard scheme comprises the provision in each port of a 400 volt, three phase, fifty cycle alternating current supply from plug sockets of a uniform type and capacity, installed at intervals not exceeding two hundred feet along the berths. No neutral connection is provided. Sockets are ASEA type KPA, rated sixty amperes, three-pin with scraper Earth, having an integral switch interlocked mechanically with the plug.

Ships Requirements.

Ships served with electricity from the shore can be roughly classified into two groups according to voltage and loading. Those taking the most current are modern motor ships, commonly about 3,000 or 5,000 tons dead weight. These have a 230 volt direct current electrical system, and require up to 30 kilowatts for the essential domestic services and lighting. For 230 volt ships it is necessary, under Lloyd's Regulations, to maintain direct current on the ship's switchboard, and in ships of New Zealand Registry, a motor generator set is provided for converting the shore A.C. supply to D.C. A common size, and the maximum practicable size for a 60 amp. supply, is a set with a 30 kilowatts D.C. generator and a 45 h.p. three phase squirrel cage induction driving motor.

Small motor ships usually have a 110 volt D.C. system, and a loading for domestic services and lighting of less than 10 kilowatts. Steamers up to nearly 7,000 tons are also served, but as these are old ships and have steam heating in the accommodation, the electrical loading is also, in general, low, up to 10 kilowatts. The steamers usually have a 110 volt D.C. electrical system, and are thus classified with the small motor ships. Ships wired for 110 volts D.C. can be connected to the shore supply through a transformer, and this is usually done. If sanitary and refrigerator pumps have to be operated in port, small plate rectifiers are installed to maintain direct current supply to the motors. On small 110 volt motor ships where cargo winches are operated from the shore supply, a motor generator set, as for 230 volt ships, is used.

It is of interest to note here that ships on Australian registry are fitted with plate rectifiers instead of motor generators. In New Zealand, motor generator sets have been regarded as a better proposition for use in ships, and are practicable because of the uniform 50 cycle A.C. supply in all ports. In one Australian port, the frequency differs from 50 cycles, and motor generator sets of standard type cannot therefore be used.

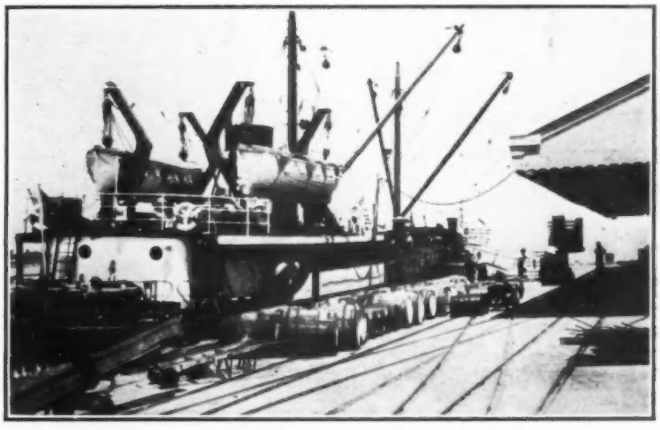

Fig. 1. Coastal vessel working cargo using shore electricity supply. The electric cable between the ship and shore can be clearly seen.

Table I summarises the supply given by the Auckland Harbour Board over a twelve month period ended 30th September, 1953. It will be noted that figures for ships with motor generator sets and with transformers are segregated for each harbour, and roughly analysed.

Table I

Harbour / Type of Ship Installation	Waitemata M.G. Set	Waitemata Tsfr.	Manukau M.G. Set	Manukau Tsfr
No. of ships in port over 1,000 tons	14	10	—	—
No. of ships in port under 1,000 tons	5	9	4	6
Times in port, all ships, 12 months ...	210	146	57	27
Total days in port, 12 months ...	970	921	312	105
Total electricity supplied, units ...	125,967	27,914	35,073	6,423
Units per time in port :				
average all ships	600	191	615	238
maximum one ship	1,660	814	804	263
minimum one ship	146	82	450	34
Units per day :				
average all ships	130	30	112	61
maximum one ship	255	96	160	84
minimum one ship	16	10	77	34
Grand total units used	153,881		41,496	

The amount of power used is dependent on the routine of individual ships. A ship with a transformer will commonly shut its generator down on arrival, and not restart it until departure. A large ship with a motor generator set may run this during meal breaks as well as when cargo work ceases for the day. While cargo is being worked, the ship's diesel engine driven generator is run to supply power to the cargo winches, and this carries other electrical load while running. Small vessels with a motor generator set capable of supplying the winches usually run this set con-

Supply of Electricity to Shipping—continued

tinuously while in port, and while working cargo may draw about 200 units of electricity per day from the supply.

Siting of Switch Sockets.

It is by no means easy to secure suitable positions on wharves for the switch sockets which receive the plug on the ship-to-shore cable. The position must be easy of access, and the socket must be protected from mechanical damage, if the position is exposed. If the socket can be mounted vertically, damage from water is unlikely, but if vertical mounting is impracticable, a suitable housing must be provided, designed particularly to prevent the penetration of water from the hoses used for washing down the quays.

The obvious position for the sockets is close to the wharf kerbing, preferably in a box recessed in the deck. It was impracticable to provide recesses in concrete wharves here, having regard to the

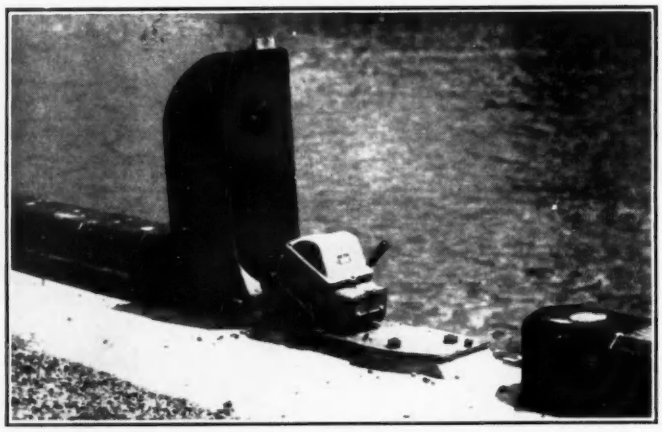

Fig. 2. Kerbside Electric Supply socket (shown open).

location of other existing services and facilities. A box in the line of the kerbing (shown open) in Fig. 2 has therefore been developed. Cables plugged into kerb sockets, 200-ft. apart, are subject to possible interference from ships' lines, to damage by wheeled traffic, and by mishandled cargo. The rise and fall of tide, 12-ft. at springs in Auckland, 16-ft. at Onehunga, together with the changing draught of the ship, make vigilance imperative at all times to ensure that the vulnerable bight of the cable where it leaves the wharf is not crushed or chafed. There has been one fatality in New Zealand due to this cause, although not with a ship's supply cable.

Where there is a conveniently placed cargo shed at a berth, the sockets are mounted on the side of the shed. Although the suspended cable may be a source of annoyance, on occasion, to those handling cargo, it is visible and therefore less likely to sustain unobserved damage. In this situation arrangements must be made so that the weight of the cable is not taken by the plug connection, and this has been found to be the point requiring most attention. Vigilance is still necessary, as on one occasion when a locomotive stopped with its funnel immediately beneath a cable.

Cables are not damaged very often, but it has been deemed advisable to draw attention to the contingencies in the conditions of supply arranged by the Board, part of which reads as follows:

"The ship's master shall be responsible that adequate arrangements are made to attend the cable from the ship to the shore so that:

(i) Damage can not occur to rise or fall of tide, or by other movements of the ship.

(ii) The ship's cable where it is laid on the wharf has no unnecessary slack, and is so placed and protected that the cable sheath will not be damaged.

If damage should occur to the cable between the ship and the shore, the cable shall immediately be taken out of service and not used again until it has been repaired and re-vulcanised."

The number of sockets installed to date in Auckland is 59 at cargo berths and 11 at repair berths.

Ship-to-Shore Cables.

Ship-to-shore cables are standard industrial rough service tough rubber sheathed flexible cables. In New Zealand they are carried by the ships in suitable stowage positions, and are 150-ft. long when new. The cables are permanently connected to the ship's wiring at one end, and have a standard sixty ampere rating plug, regardless of the cable size, at the other end. The permanent connection is made to the terminal box on the engine room casing, which may be either amidships or aft. The arrangement thus differs from that in Australia where the ship's wiring terminates at a standard inlet type socket and the connecting cable is brought on board from ashore.

The question of whether or not the ship-to-shore cable should include a core for earthing purposes is a subject on which opinion differs. Provision of an earth core is mandatory in Australia, but not in New Zealand, with the result that, here, some shipping companies provide the earth connection in accordance with common industrial practice, but others do not. There is no direct evidence, locally, that an earth core is essential for reasons of safety in steel ships. Because of an element of doubt in the matter, however, the local conditions of supply, for the time being, place the responsibility on the shipping company for an untoward occurrence attributable to the omission of a connection with the shore earth.

Administration.

In New Zealand, the use of electricity ashore is very closely regulated by the generating authority, the State Hydro-electric Department. The Electrician's Act and Electrical Wiring Regulations, administered nationally by the department, apply to the shore electrical installations up to the switch sockets on the wharves, local administration being in the hands of power boards which distribute the electricity. Statutory authority is conferred on harbour boards to resell the electricity so distributed.

The Marine Department, which regulates shipping on New Zealand registry, has effectively co-ordinated ship and shore electrical installations, but is responsible only for the ship electrical installations, including ship-to-shore cables. Shipowners employ registered electricians for the electrical work done in the ships, so that few difficulties in detailed administration arise for the Department's Engineer Surveyors of Ships. Liberties have been taken on occasion when an electrician has not been readily available, and harbour boards and power boards therefore tend towards policies of caution. The following requirement has therefore been included in the Auckland Harbour Board's conditions of supply:

"The operation of plugging the ship's plug into the shore socket and operating the switch at the socket shall be carried out by a responsible and suitably qualified representative of the Shipping Company, or of the ship's master.

Such representative will not be entitled to connect the ship's plug into the shore socket unless:

(i) The ship's installation has been approved by an Engineer Surveyor of ships.

(ii) The representative is satisfied that the plug has not been wet, or if wet, has been dried out and proved to be suitable for use.

(iii) The connection of the cable to the plug has been made in correct and workmanlike manner.

(iv) The cable sheath is in undamaged condition, or if damaged, has been repaired and re-vulcanised."

The position in connection with the use of electricity by repair firms is similar, but administration is not quite so straightforward. Electrical equipment brought from shore workshops is subject to shore regulations while on the wharf, but not if moved on to a ship. This anomalous position has been covered by the Auckland Harbour Board, which requires shore standards to be observed on all gear connected to its supply, wherever placed, and also requires acceptable arrangements to be made for periodical testing and maintenance.

Technical Details.

Different fusing arrangements ashore are necessary for different classes of ships requiring electricity supply. Although the nominal

Supply of Electricity to Shipping—continued.

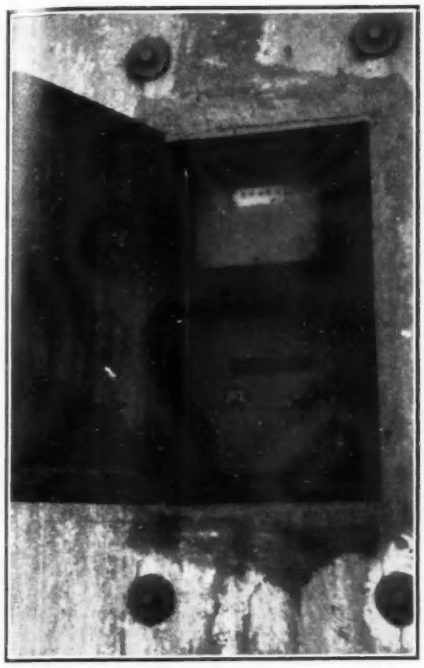

Fig. 3. Switchfuse and Metering Unit for electric supply for ship.

rating of the largest ship-to-shore cable used may be 60 amperes, a cartridge fuse of this size may be blown by the starting current of the ship's motor generator set. Circuits for ships with motor generator sets are therefore fused at 80 amperes. A similar problem with high switching currents does not arise on circuits for ships with transformers. These circuits are fused at 30 amperes, the maximum requirement for such ships, and a reasonable minimum for a service fuse even though the associated ship-to-shore cable may not not be fully rated for this current.

Fuses are, for the most part, located in switch fuse and metering units on the sides of wharf sheds, as shown in Fig. 3. The unit is left unfused until a demand for the circuit is received.

At Onehunga, a small relatively isolated port at a bar harbour, a different arrangement is adopted. Here, to eliminate the need for fuse changing, the circuit to the socket is fused at 80 amperes, and an auxiliary switch and fuse unit with 30 ampere fuses is installed adjacent to the socket. The switch in this unit is connected so that the 30 ampere fuses are by-passed when the switch is in the on position, and the ship's engineer is thus enabled to select the fuses required by his ship-to-shore cable.

In heavy industries it is common practice to provide earth-leakage protection for large trailing cables used in positions where they may be damaged, and where workmen or others may come accidentally into contact with them. This practice is adopted because the resistance of a fault path through earth back to the neutral of the transformer may be too high to pass the necessary current to blow the protecting fuse without undesirable delay. For an 80 ampere cartridge fuse, a fault current of about 200 amperes is required if the fuse is to blow within one minute of the occurrence of the fault. This necessitates a fault path resistance of about one ohm or less, and experience shows that a resistance as low as this, capable of carrying a heavy current, is often difficult to obtain even by deliberate action. It is thus desirable to provide some means of reducing the magnitude of the fault current required to clear the circuit.

Introduction of earth-leakage protection on a multiple-earthed-neutral (M.E.N.) alternating current system is not a straightforward procedure, and compromise is necessary. Here, a sufficient degree of protection is provided by grouping the 60 ampere switch-sockets on to 150 ampere feeders having three phase conductors only, and providing each feeder circuit breaker with a direct acting earth-leakage trip. The trip coil is energised by a core balance current transformer, and operates instantaneously for a fault current of 22.5 amperes or more. An earth-leakage indicator is provided on each circuit breaker in addition, so that incipient faults can be detected at an early stage.

Switchgear and Cabling.

Provision of electrical power for shipping has been concurrent with arrangements to changeover all wharf circuits, except crane circuits, from the D.C. system on which the port and city were developed, to the A.C. system of supply.

Changeover work is proceeding. When complete, the central waterfront will be served by the supply authority from a high tension feeder looped in and out of three small substations. These are each designed for a final loading of 750 KVA, but 300 KVA transformers are being installed initially.

The Harbour Board supply will be taken through main meters to a main switchboard in each substation. These boards will supply distribution switchboards on each wharf. In the meantime, the distribution switchboards are temporarily energised directly from the city network for the purpose of giving power to shipping. All main and distribution boards are to be interlinked on the low tension side, and with the city network. Switching errors will be safeguarded by a system of "Castell" key locks.

Main switchboards are conventional switchfuse boards, with fuses loaded for short circuit protection in accordance with common distribution practice. Distribution switchboards comprise an incoming isolating switch and outgoing circuit breakers. These are of the air break type having direct acting thermal trips for cable overcurrent protection, with back-up series fuses for short circuit protection. A typical wharf with berths on each side and sheds in the centre, has four circuit breakers for separate lighting and power mains which are carried down each side of the wharf. Lighting mains pick-up switchrooms and power mains interconnect switch socket control units, all on the ring main principle. When a fault occurs on one side of a wharf, the faulty section of main can be isolated and a link made between the mains at the outer end of the wharf.

For cabling, some 50,000 yards of single core mineral-insulated copper-covered conductors have been obtained for wharf mains, and 40,000 yards of multi-core cable of the same type for wiring. This cable is regarded as a convenient, economic and reliable form of conductor for use on and below wharves.

For long runs and heavy currents, M.I.C.C. cable becomes uneconomic. The conventional alternative of paper-insulated, lead-covered and armoured cable was considered and found to be less

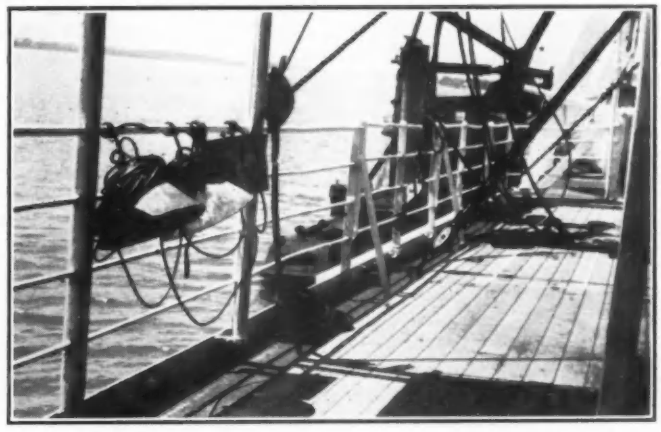

Fig. 4. Distribution Box and Clusters secured to the ship's rail during daytime.

attractive than the recently introduced paper-insulated, aluminium-sheathed cable. Over 10,000 yards of the latter have been obtained to date. Special anti-corrosive servings are provided, and special precautions are taken at sealing ends. Less difficulty in installation and fixing is experienced than with the larger overall diameter and heavier lead-sheathed alternative, and it is hoped to avoid crystalline fracture of the sheath as experienced with lead on railway wharves where vibration occurs.

Other Services.

The service given to shipping and repair firms by way of an electrical supply at 400 volts has been described. To conclude, brief mention is made of services at lower voltages.

Ships worked in Auckland commonly use cargo clusters and

Supply of Electricity to Shipping—continued

portable floodlights provided by the Board. The number used on any one night varies considerably, the maximum to date being 180. As many as 24 cargo clusters have been provided on a single poorly lit tramp steamer, and the organisation for maintaining and attending these, together with the associated distribution boxes and shore leads, is a significant item in the port arrangements. Fig. 4 shows two clusters with a distribution box lashed to the ship's rail available for use at night. The boxes have fuses, and a standard three-pin plug socket for each light. Up to four lights can be plugged into one box, and up to three boxes can be plugged up in parallel.

At most wharves the portable lighting equipment is supplied from the 230 volt direct current wiring system. This supply is also made available to repair firms for portable tools and hand-lamps. When changed over to alternating current, it will be necessary to adopt a lower voltage, and trials have been proceeding to this end.

The new A.C. voltage will be 110 volts, derived from transformers on the wharves having the mid point of the low voltage secondary winding earthed. Two arrangements for using the supply are under trial. In the first, plugs with solid pins are used in conjunction with distribution boxes carrying fuses, as with the direct current supply. In the other, which has a number of advantages, plugs with fused pins are used. Both arrangements entail the use of plugs of different type to the New Zealand standard three-pin plug used for the 230 volt D.C. supply, and this, with the change of voltage, introduces problems for repair firms desirous of obtaining a low voltage supply on the wharves as well as a 400 volt supply.

It has been encouraging to find that one local shipyard has adopted a 110 volt A.C. supply for portable tools, instead of 230 volt. It is the author's hope that other local industrial firms will adopt the same policy, and that fittings and arrangements at this voltage will, in due course, be standardised to the advantage of all.

Conclusion.

In this article, experience in a field of interest to port authorities and shipowners has been recorded factually, in the hope that the record will be of interest and assistance to them, and that it will also be of interest to New Zealand electrical supply authorities who have Harbour Boards among their consumers. There are, of necessity, aspects which must go unrecorded, but it can be stated with confidence that the supply of shore generated electricity to coastal ships is resulting in the achievement of an economy in the use of imported fuels, a longer service life for the engine driven generators in the ships, and an economy in the use of labour, in addition to the prime object, mentioned in the opening paragraph, of allowing engine room staff to go off watch while the ship is in port.

Overhaul of Caisson Gate

Intricate Operation at Southampton Docks

The operation of removing and drydocking for major overhaul, the caisson gate of the King George V Drydock at Southampton has recently been completed. The caisson is now in No. 3 drydock for repairs, renewal of the greenheart timber meeting faces and examination cleaning and painting of all interior and exterior steelwork not normally accessible.

This is the first time the caisson has been drydocked since 1933, when it arrived in tow from the builders, the Furness Shipbuilding Company, Haverton Hill-on-Tees.

It was originally intended to dock the caisson in No. 6 (Trafalgar) drydock, where it could have been cradled in its normal upright position. This would have meant, however, that for a time, Southampton's two largest drydocks would have been out of action. It was therefore decided to put the caisson into one of the smaller drydocks, No. 3, which necessitated the caisson being turned over on its back in a horizontal plane, with a draft of 13-ft. as compared

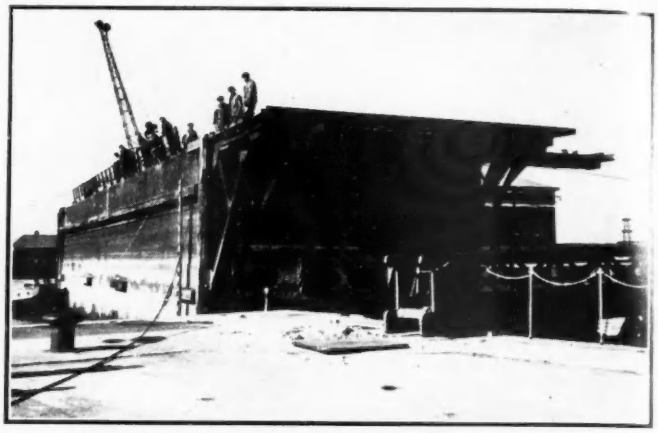

Fig. 1. Approximately one quarter of the total quantity of water ballast has been pumped out of the caisson, thus raising it about 16-ft. above its normal level and high enough to allow the brackets and bracing supporting the cantilevered platform to pass over the dock coping at the entrance to the camber. The caisson is shown at an early stage in the operation of removing it from the camber. The gangway in the right foreground has been placed across the entrance to the camber as a temporary measure whilst the caisson is out of position.

with 31-ft. 9-in. in the upright position. This scheme leaves Nos. 5 and 6 drydocks free for all the large vessels which normally drydock in Southampton with the exception of the two "Queens."

A brief description of the caisson will give some idea of the work involved:

It is of the steel box sliding type with greenheart timber meeting faces which form a watertight joint when up against the accurately dressed granite meeting faces, or stops, of the drydock.

It is double-faced, that is to say, water can be pumped into the dock and the level therein maintained throughout the whole range of tide in the river.

The dock is opened or closed by sliding the caisson into and from the camber at the side of the dock. Provision was made in the design of the dock entrance for the caisson to occupy any one of three different positions. The normal working position is against the inner stop, when water can be excluded from the dock at any state of the tide. The caisson takes up its position against the impounding stop when it is necessary to maintain a high level of water inside the dock, irrespective of the state of the tide outside. The third position is what is known as an outer or emergency stop, situated at the extreme outside limit of the dock entrance and it is at this position that the caisson will be placed when it returns from drydocking so that the dock can be emptied and the steel slide path and the caisson camber examined and any necessary repairs effected.

The principal dimensions of the caisson are:

Length	... ...	141-ft. 9-in.
Breadth	... ...	29-ft. 6-in.
Height	... ...	58-ft. 6-in.

Fig. 2. The caisson is in the body of the drydock. Three quarters of the total water ballast has been pumped out and the caisson has made about two-thirds of its turn from the vertical to the horizontal position.

Overhaul of Caisson Gate —continued

When the dock is dry the total water pressure against the caisson at high tide is about 6,000 tons. The weight of the caisson, including some permanent concrete ballast is 1,870 tons. The total weight, with the water ballast and in working condition, is 4,690 tons. When the dock is flooded and the caisson is moved into position, the displacement is about 4,655 tons, dependent on the level of the tide; thus the actual weight on the slide path is about 35 tons, again depending on tide level.

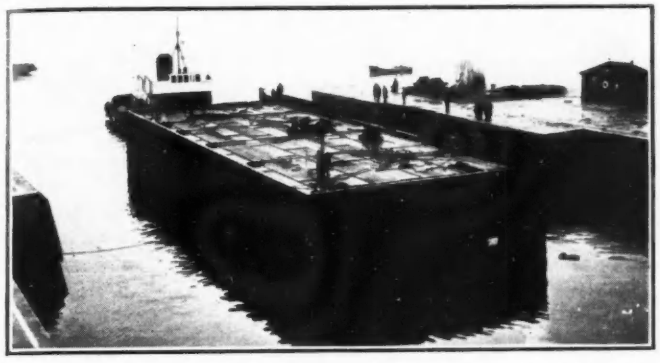

Fig. 3. The turning over of the caisson has been completed and the tow to No. 3 Drydock commenced. The camber or recess into which the caisson slides in order to open the dock under normal working circumstances can be seen on the left, just above the flight of steps.

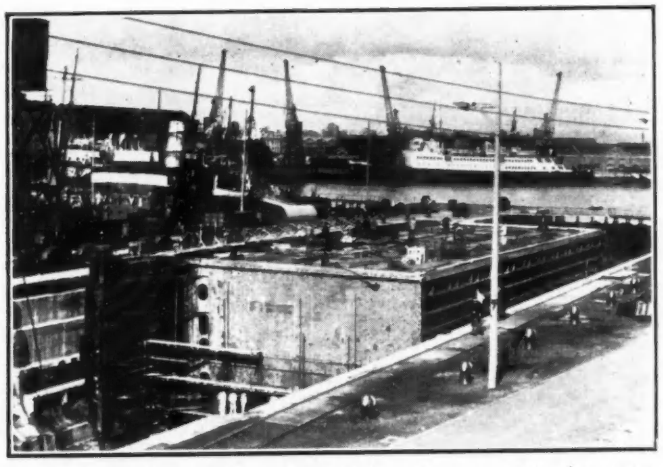

Fig. 4. The caisson in No. 3 Drydock. To the right, the girders carrying the bottom deck of the caisson can be seen.

The caisson is divided, horizontally, into four main compartments by three intermediate watertight decks. The top compartment is open to the tide, the inner, or dock side, skin plating preventing water from entering the dock. The second compartment from the top is an air chamber and contains a pump and piping which can be used for pumping water ballast from the tanks in the next lower compartment. The third compartment from the top is divided into three tanks by two vertical cross bulkheads; in working condition, all three of these tanks are full of water but can be emptied by using the pump in the air chamber. If the centre tank or the two end ones are pumped out the caisson floats with a draft of 37-ft. 6-in. and if all three tanks are emptied the caisson will float with a draft of 31-ft. 9-in. and will still be stable in the upright position.

The bottom compartment is also full of water but if even a small quantity is pumped out the caisson is no longer stable vertically and will take up an inclined position.

As already mentioned, to drydock the caisson in No. 3 drydock it was necessary to incline it from the vertical to the horizontal position, which meant pumping out most of the water from the bottom compartment. The operation of turning the caisson on its back was a tedious one as the fixed caisson pump cannot be used for de-watering the bottom compartment. A small portable submersible electric pump had to be lowered through an access trunk to the bottom chamber and it took twelve hours continuous pumping to remove about one half of the water. It was then possible to get a second pump to work and the remainder of the operation was completed in a further seven hours. The total quantity of water removed in the nineteen hours was 1,460 tons.

The following is a timetable of the complete operation:

Thursday, March 4th. Water ballast pumped from centre tank of third compartment to raise the caisson sufficiently for it to be manœuvred out of its normal position.

Friday, March 5th. Caisson taken out of groove and moored alongside wall of dock. Water pumped from two end tanks of third compartment, thus completing de-watering of that compartment.

Saturday, March 6th. One half of water removed from bottom compartment (twelve hours pumping with one submersible pump).

Sunday, March 7th. All but 10 tons of remaining water in bottom compartment removed (seven hours using two submersible pumps).

Monday, March 8th. Fifty tons of iron and steel ballast placed on top of caisson to correct tilt making the caisson truly level, ready for towing.

Tuesday, March 9th. Caisson towed to No. 3 Drydock and docked on specially prepared cradle.

The work, the planning of which started six months ago, is under the direction of Mr. J. H. Jellett, O.B.E., the Docks Engineer, and the pumping operations under Mr. E. S. Ely, the Docks Mechanical and Electrical Engineer.

Handling Perishable Goods

Technical Conference Concerning Fruit and Vegetable Cargoes

In the February issue of this journal was published a report of a Cargo Handling Symposium held under the auspices of the International Cargo Handling Co-ordination Association in Rotterdam. An account is now given of a Technical Conference held by this Association in Paris on 15th March. The subjects under discussion were the handling of perishable goods in ports and French Customs regulations with regard to containers and pallets. The emphasis was on the handling of soft fruits, and the following papers were read:

(1) "The Care of Perishable Cargoes from Packer to Consumer," by Captain H. J. Dean, Managing Director, Cargocaire, Ltd., London.

(2) "The 'Emile Dubuisson' Warehouse at Dunkirk, specially equipped for the handling of Fruit and Early Vegetables," by Mon. R. Chevrier, Port Engineer, Dunkirk.

(3) "The Evolution of 'Pocket' Gear for Loading and Discharge of Ships," by Mon. R. Anaw, Managing Director of Sté. Des Anciens Etablissements Noel Ainé, Pellegrini & Cie.

(4) "Customs Regulation with regard to Containers and Pallets," by Mon. Semini of the French Customs Administration.

(5) "The Handling of Fruit and Early Vegetables in the Port of Marseilles," by Mon. Goudchaux, Director of the Marseilles Office of Worms & Co.

(6) "The Discharge of Bananas in the Port of Rouen," by Mon. P. Cintrat, Director of Transit and Transports, Jules Roy.

Need for Adequate Ventilation.

Captain H. J. Dean's paper on the care of perishable cargoes from packer to consumer dealt mainly with the question of the

Handling Perishable Goods—continued

ventilation of fruit and vegetable cargoes and the problems of preventing the accumulation of the products of their metabolism which are chiefly heat, carbon monoxide, and water vapour. Accumulation of heat will hasten the ripening process, and as the rate of metabolism rises, so does the rate of production of its products, and deterioration becomes more rapid. Concentration of carbon dioxide, above a certain level, suffocates the fruit and causes the death of the tissues. A high water vapour content encourages the growth of moulds, and should it condense on the cargo in liquid form, rot will soon set in. The answer to this, Captain Dean stated, was adequate ventilation, and he went on to say that in all but the shortest voyages, natural ventilation, which depends upon the vagaries of the wind, is patently inadequate and some form of mechanical ventilation is needed when fruit and vegetables are carried.

In some trades where a fruit cargo had to be carried through latitudes of high temperature, refrigeration has to be employed. For example, apples can be carried safely from Canada to the United Kingdom with mechanical ventilation only, as the voyage is comparatively short and the climate is cool. From Australia, on the other hand, the voyage is long and largely through the tropics, making refrigeration essential.

Conveyor Gear for Bananas.

Mon. R. Anaw's paper on the evolution of " pocket " gear for loading and discharge of ships dealt mainly with the banana traffic. It was in the early 1930's that this trade went through a period of considerable development, the planters and lighterage companies in the Antilles realising the necessity of employing conveyor gear for banana loading. At the same time, plans were envisaged in France to speed up the discharge of bananas and to do so without violent shocks and to protect the cargo from variations in temperature. A study of the problem led to the adoption of the " pocket " type of equipment, in which each package is transported as if in a hammock.

The Port of Le Havre were pioneers in installing such apparatus. The installation is best described as " flying " equipment, consisting of a beam-like structure straddling the ship between the hatch coamings and the side, and being supported by wooden trestles. The conveyor portion of the gear consists of an apron formed by two lateral chains linked by struts on loose axes supporting the canvas which forms pockets. When passing over the apron at the loading point, the packages are thrown into the pockets, and when these pockets arrive at the discharging point special receptacles automatically eject the packages, either on to reception platforms or on to conveyor belts.

In 1935 Rouen became interested in the banana traffic and, based on experience gained at Le Havre, specified that the conveyor should be mounted on wheels so as to avoid using quay cranes, which would do away with restrictions on the weight of the equipment and would ensure that the gear could be put into position more quickly. It was also stipulated that the rate of discharge for each conveyor should be 1,500 bunches per hour, continuous. In order that the space between the warehouse and the edge of the quay should be kept entirely clear, the bunches of bananas were to be fed into the warehouse through openings in the roof. Profiting from the experience gained at Le Havre, the conveyors were entirely covered from hatch to warehouse. Thus from ship's hold to warehouse interior the stems of bananas travelled inside a continuous sheltered tunnel.

While the ports of Le Havre and Rouen were being equipped for handling bananas, the Port of Marseilles was installing similar equipment for handling cargoes of early vegetables from North Africa.

Dieppe, however, chose an alternative system and installed portable runways with a retractable front to unload stems of bananas, which were placed on padded trays. This equipment gave complete satisfaction from the point of view of output, but was subject to severe criticism by the banana importers on the grounds that the stems in motion were completely exposed and subject to rough handling. Dieppe therefore replaced the portable runways with conveyor gear, in the design of which it was stipulated that the stems should be moved under cover and at a constant temperature whatever the variation in the external temperature might be. During the war years the installations at Le Havre, Rouen, Dieppe and Marseilles were dismantled. Dieppe reconstructed the banana berth in 1945/6 and was able to achieve the discharge of bananas from hold to warehouse without break and at a constant temperature at an economic rate.

It is interesting to note that the first portable installations at Rouen, constructed in 1935, weighed 28 tons, and that new equipment now under construction at Dieppe will weigh about 80 tons.

Experience gained by experimental work has made it possible to use " pocket " type equipment for loading sacks of cement, and Mon. Anaw envisages the handling of bags of coffee and even sacks of grain by this method becoming a practicable proposition.

Suggestion for a Quicker Turn-round.

Mon. P. Cintrat's paper on the discharge of bananas in the Port of Rouen gave a history of the port's interest in this trade, and went on to describe the packing, transport and warehouse problems involved in the shipment of bananas. On the question of discharge, Mon. Cintrat put forward an interesting suggestion. " One wonders," he said, " whether it would not be a good thing to speed up unloading and consequently shorten the time spent by banana ships in port, and to decrease wasted time caused by the fact that the stems blocking up hatches in 'tween decks have to be shifted before these can be opened. Certainly a solution which would enable a kind of trap-door in each hatch to be opened and through which the hook of the ' pocket ' gear could be lowered without having to move any of the stems, would be excellent. It would mean that the ship would have slightly less carrying capacity, but it would also mean a gain of at least 2 hours in the whole unloading operation—which might, in some cases, mean the gain of a tide. Small portable conveyors for use in 'tween decks might one day simplify handling in the holds."

The Palletainer.

In his paper on handling fruit and early vegetables in Marseilles, Mon. Gouchaux divided fruit cargoes into three types: those arriving in cases, containers, and on pallets. A ship arriving in Marseilles with a cargo of early fruit and vegetables might have numerous types of packages ranging in weight from 20 lbs. to 60 lbs. Where a vessel is equipped with cargo doors, belt conveyors and slides are used to convey the cases from the ship to the shed, the sorting being done by hand in the shed. When containers were first introduced in the fruit trade they were loaded with cases, and fitted trays came later. A more recent development was to put oranges in nets or small bags, each containing 2 lbs. or 10 pieces, which are more or less the retail units. Containers weighing as much as 2 tons sent to various centres throughout the country raised awkward problems for those who had no lifting facilities, and to overcome this difficulty the palletainer has been introduced. This is a small container in open work, either constructed of wood or strong steel wire with collapsible sides, specially designed for the carriage of fruit and vegetables. Palletainers have been built suitable for handling by fork-lift trucks. Sufficient experience has not yet been gained of the palletainers to say how far they are likely to be economic and practicable.

In July 1953 a consignment of fresh grapes was shipped from North Africa. There was a shortage of containers to take the entire shipment and at the suggestion of one of the North African stevedores the grapes were placed on very light wooden trays covered with a sheet of paper. The trays were then loaded on to pallets, 84 to a pallet, and 2 pallets were secured together with a steel wire, thus building up a unit load of 800 kilos. The grapes arrived in Marseilles in perfect condition. A similar shipment of cased oranges on pallets made up into loads has also been successful.

Mon. R. Chevrier read an interesting paper on the " Emile Dubuisson " warehouse at Dunkirk, which is specially equipped for the handling of fruit and early vegetables. Customs Regulations affecting containers and pallets was the subject matter of a further paper read at the Conference by Mon. Semini and as both these papers are concerned with matters of interest and of particular importance to many readers of this journal, we hope to refer to them in greater detail in our next issue.

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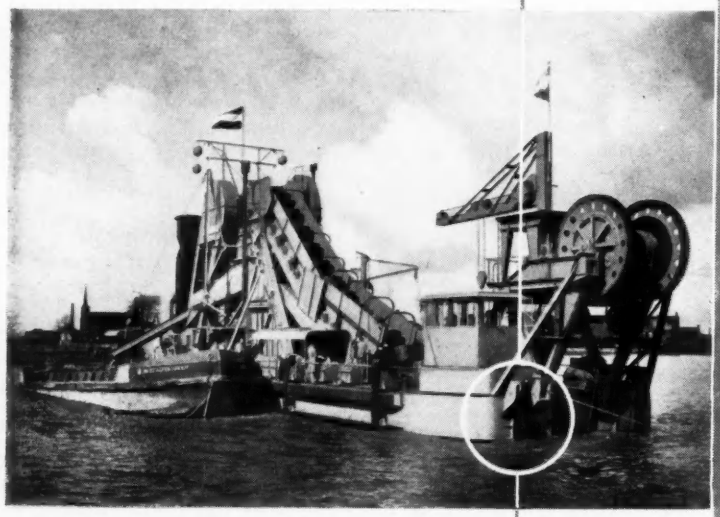

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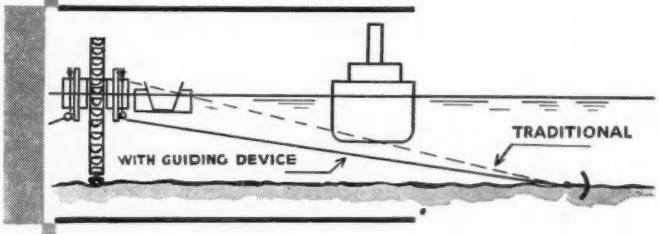

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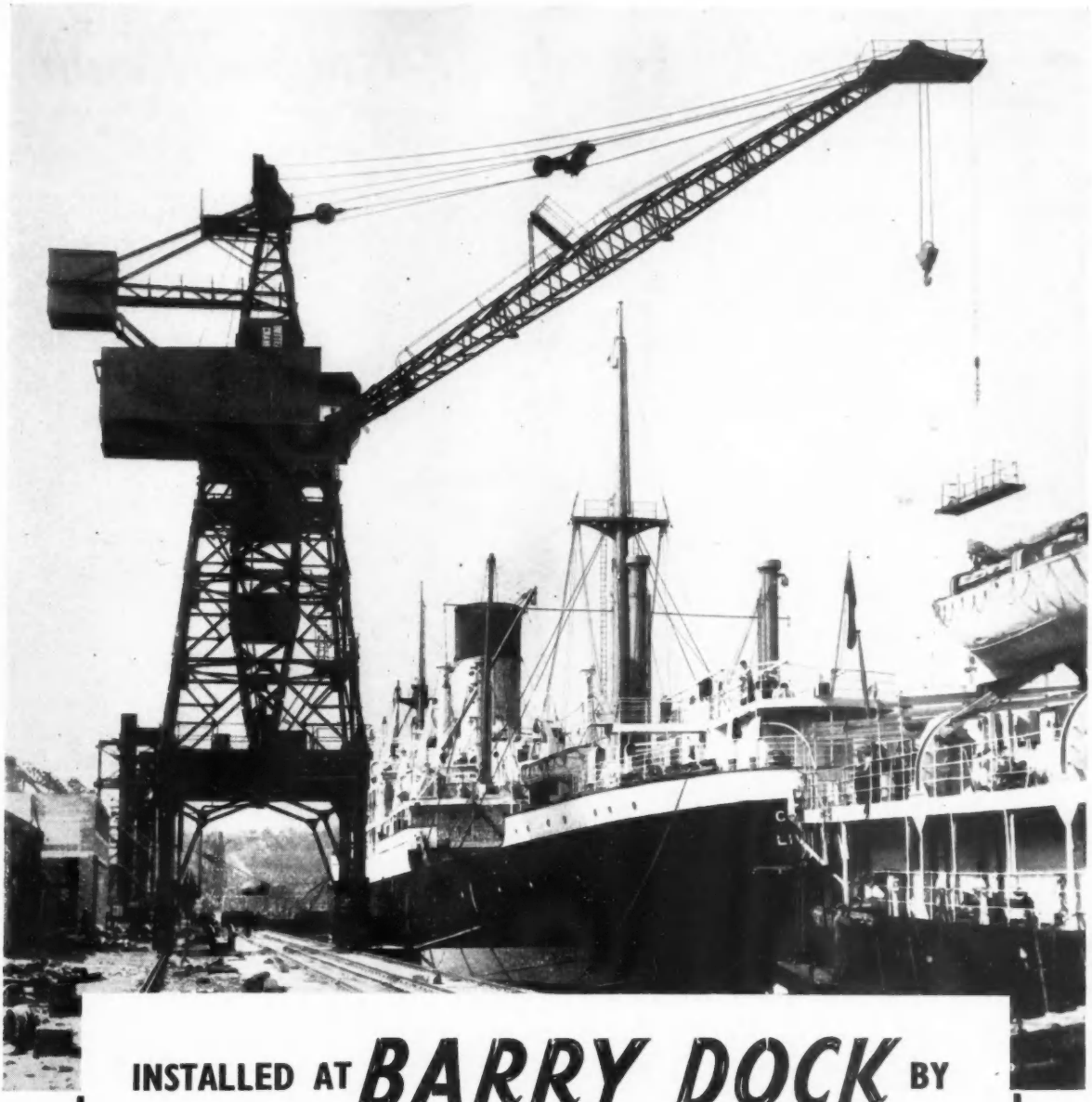

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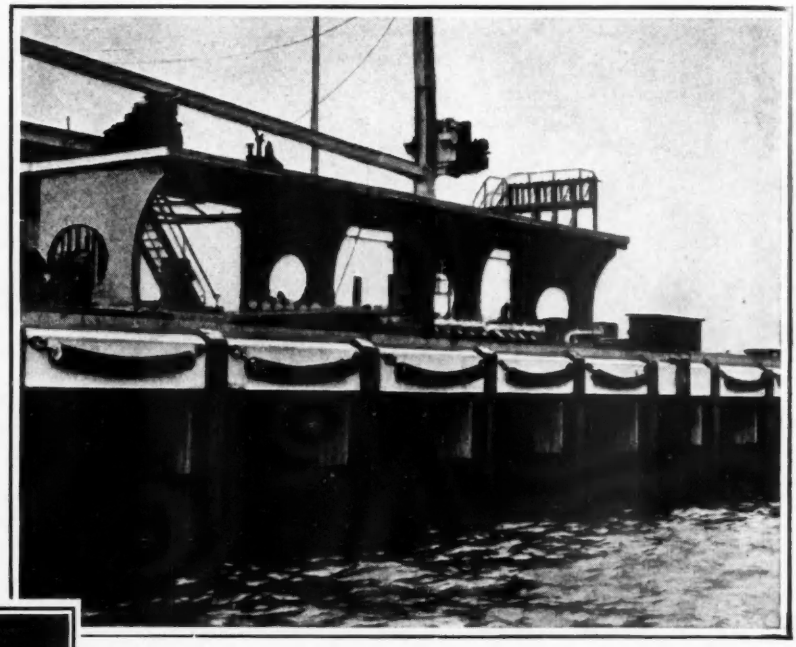

Netherlands Quay simply and adequately protected. *This installation at a dock in the Netherlands shows just how neat and simple Goodyear Rubber Dock Fendering can be. Maintenance and replacement expenses are practically eliminated.*

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★ Eliminates mechanical shock absorbing devices.

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Correspondence

To the Editor of *The Dock and Harbour Authority.*

Dear Sir,

Fatal Beliefs on Flooding Levels

Dr. J. Van Veen has shown good cause for alarm in pointing out that flood records tend to be broken every 30-40 years as an average by new flood levels which are, on the average 10-in. higher than the previous one. While one would not presume to argue with his scepticisms on the matter of subsidence records, it occurs to me that there is a greater and possibly over-riding factor, namely the persistent rise in the mean level of the sea.

It appears to be well established that the earth is emerging from a glacial period, and has been doing so for some time. Accurate records are available only in recent years, but they go to show that concurrently with the retreat of glaciers and polar ice caps the total volume of sea water in circulation is on the increase. Rachel Carson gives but one instance (The Sea Around Us, p. 98) in a reference to the observations of the U.S. Coast and Geodetic Survey which have recorded a rise of nearly 4-in. in the mean sea level on the Atlantic Seaboard in 18 years.

Land masses such as Greenland and North Scandinavia which are being relieved of their icy overburden may in the long run be relatively unaffected, since they tend to rise in relation to the earth as a whole. On the other hand, low-lying lands such as Holland and East Anglia which have long since lost their glaciation are without any compensation. It is not for me to attempt to predict what may be the repercussions of a rise of mean sea level on storm surges. It does seem, however, that the long term planning of sea defences should be made in a spirit of calculated pessimism, and in the light of a major sea change which is far beyond the control of man.

Reigate. Yours faithfully,

March 21st, 1954. A. H. LAURIE.

To the Editor of *The Dock and Harbour Authority.*

Dear Sir,

Fatal Beliefs on Flooding Levels.

Some years ago when looking over an article on rivers by Dr. Van Veen I commented gently on the language, and he admitted that perhaps for a technical subject it sprang " too much from the heart." For this admirable Dutch engineer the well being of his country's dykes is so inseparable from his heart as to warrant an English examination of the four " fatal beliefs " that he lists. He is no prophet after the event (a distinction which I share in a more humble manner) and that he forecasts more woe and destruction must merit proper attention.

A fundamental difference between the countries is that the area around Amsterdam N.A.P. base is a recent fluvial and maritime deposit whilst Newlyn is a very solid granite formation well away from the most recent glaciation. So periodical re-levelling in this country yields as a by-product valuable data as to subsidence relative to the Newlyn granite and the tide gauge there records continuously the sea level.

It is difficult to see how movements fatal to the remainder of the country can occur. If the sea level is rising and the Newlyn granite rising relative to the remainder of the country periodical levelling of bench marks will lower their values and sea walls built to Newlyn standards of levels would have to be raised. If, on the other hand, Newlyn granite is stationary or sinking and the sea level rising it will show consistently on the tide gauge and again sea wall standards would have to be revised.

Dr. Van Veen lists four fatal beliefs, the level of 1953 as being the supreme height of flood, discounting of the record of continuously higher floods as due to local settlement of the flood marks, trust in averages and trust in frequency curves for flood height prediction.

That 1953 provided the supreme flood level has not yet been stated in any English journal and if tidy administrative minds are leaning to such belief it has nowhere been proclaimed as a doctrine. On the other hand, no one has been bold enough to say what value of supreme flood level is to be expected. The arithmetical addition of the greatest surge effect on tidal level to the highest predicted tide gives a much higher value than that of 1953 so high as to be a very great danger to London. As the surge is a dynamic phenomenon involving large masses of water it may well be that water cannot be moved rapidly enough in the southern part of the North Sea to allow the coincidence of maximum surge and maximum tide.

To comment on Dutch flood levels would be presumptuous. In this country there exist many past flood levels but no comprehensive study has been made. A few examples are the church of St. Nicholas at New Romney quoted by Gilbert. This was built on the strand gravel of that port and its floor is now 5-ft. below surrounding ground. There are the ridge levels at Dungeness carefully studied by W. V. Lewis. Recently in a Monmouthshire survey my staff picked up flood levels of 1606 on churches at Peterstone (Wentloog) and Goldcliff (Caldicot) six miles apart and on different levels separated by Rivers Usk and Ebbw they were both 23.43 Newlyn. Valuable as statistical evidence would be, a proper understanding of the mechanics of surges is the only real answer to the problem.

The question of averages and frequency prediction curves is a constant worry to Hydraulic engineers. The answers are so neat, so mathematically elegant that they can acquire a spurious respectability. Averages and frequencies depend only upon the data which goes to their make-up. For this subject of tidal levels the data is comparatively scanty and of such short duration as to make such calculations suspect to all but the most undiscerning observers.

A temporary compromise in sea wall standards put forward in my paper to the recent North Sea Floods Committee and generally accepted by speakers from Holland and England is to design walls so that they may be overtopped without failure allowing flooding limited in amount and in time without catastrophe. This cannot be a substitute for proper study and eternal vigilance but does constitute a prudent safeguard in the present uncertain position.

Yours faithfully,

C. H. DOBBIE,

58, Victoria Street, B.Sc., M.I.C.E., F.G.S.,

London, S.W.1 M.I.W.E., M.Cons.E.

To the Editor of *The Dock and Harbour Authority.*

Dear Sir,

The Time Factor in Handling Timber.

For a number of years it has occurred to the writer that existing methods of handling boards and cubed unwrought timber entail a waste of time and manpower. The times a single board has to be handled from leaving the mill to its final use in construction is legion. It is considered, rightly or wrongly, that considerable improvements could be achieved.

Briefly, it is suggested that boards and cubed unwrought timber should be made up into bundles at the mill with a total weight of approximately 30 cwts. and the bundles strongly banded. Small spacers could be inserted at intervals for air circulation and battens incorporated to allow the insertion of the forks of a fork-lift truck. Lengths of the boards need not all be exact but the ends of the bundles should be squared off so that most are full length. (There are now uses for off-cuts which did not obtain at one time.)

The whole of the subsequent handling could then be carried out mechanically. The saving of time and labour commences as soon as the bundled timber leaves the mill and continues until its delivery to the consumer. In loading to ship the bundle can be treated as cased goods and although there would be a reduction in the amount of timber carried this should be more than offset by the quicker turn-round of the ship.

On arrival in this country the timber can be discharged by crane, piled by fork-lift truck, or transferred to road or rail. The necessary equipment being already available at most of the ports in the country.

The increased cost to the mill is appreciated but it is felt that in these days of mechanisation the handling of each board as an individual parcel cannot continue indefinitely, and that this scheme would show an overall saving in cost to the consumer.

Avonmouth Docks,

Port of Bristol Authority. Yours faithfully,

25th March, 1954. T. L. MARTIN.

Banias Boat Harbour, Syria

New Terminal for Oil Pipeline

A boat harbour, consisting of a main breakwater about 2,000-ft. long, a lee breakwater, and quay walls for lighters and small craft, has been constructed at Banias, Syria, for the Iraq Petroleum Company, Ltd., to serve the terminal of the Company's oil pipeline at Banias. The breakwaters enclose some 20 acres of sheltered water for craft serving tankers moored at the deep water oil loading berths located some 6,000-ft. offshore in approximately nine fathoms of water; the tankers being loaded by means of flexible pipes attached to submerged oil lines laid on the sea bed. The width of the entrance between the roundheads of the main and lee breakwater is 200-ft.

Main Breakwater.

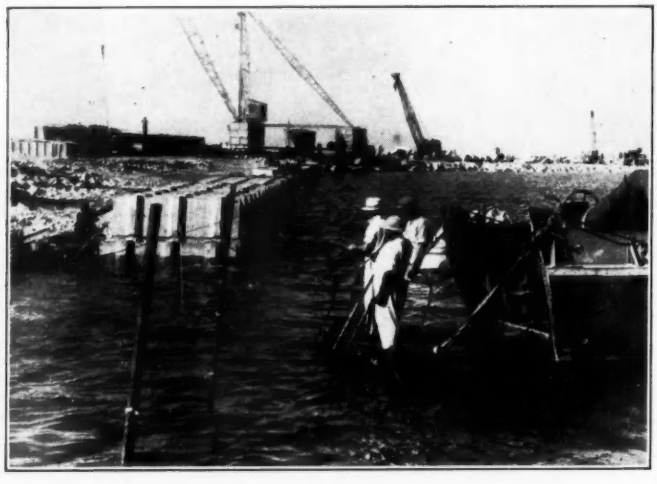
The main breakwater, providing protection from the south-west, is constructed of graded limestone ranging in size from " Quarry-run " core to 6-12 ton wavebreaker blocks, quarried from a nearby hillside, surmounted by a cast in situ concrete parapet, and finished by a roundhead at the seaward end on which is erected a white flashing navigation light. The breakwater was designed to withstand waves 15-16-ft. in height from trough to crest; 6-12 ton blocks placed to a slope of 1 in 3 being used on the seaward face. These wavebreaker blocks overlie layers of stone graded down to the quarry run core; the protective coverings to the breakwater core being formed of approved quarried stone rubble blocks of various sizes classified by weight into the following categories, each category containing at least 60 per cent. of the larger sizes:—

A Up to ¼ ton
B ¼ ton—2 tons
C ¼ ton—6 tons
D 2 tons—6 tons
E 6 tons—12 tons.

The main breakwater 2,000-ft. long from root to roundhead contains approximately 112,500 cu. yds. of quarried stone together with some 4,700 cu. yds. of concrete in the parapet. The sea bed is good firm sand with outcrops of rock. The breakwater is constructed in a depth of 18-ft. of water at the outer end, advantage being taken of an existing outcrop of rock on which the main breakwater is sited. Access steps are provided on the harbour side of the outer leg of the main breakwater and bollards are provided for the mooring of small craft.

Lee Breakwater.

The lee breakwater, providing protection from the North, is similar in design to the main breakwater being 850-ft. long and contains approximately 41,000 cu. yds of quarried stone together with some 1,900 cu. yds. of concrete in the parapet. Mooring bollards are provided on the parapet base and a red navigation light has been erected on the roundhead.



Foundation work on Mooring Quay.

Block placing on Mooring Quay.

Construction of Main Breakwater.

The method adopted for the construction of the main breakwater was generally as follows:—

(a) **Core and Blanket.**

Trucks containing stone graded as " Quarry run " end tipped their loads on a centre line 7-ft. inside the breakwater setting-out line keeping this grade ahead of the following grades. Other trucks followed up with ¼—2 ton and ¼—6 ton grades which were tipped to either side of the Quarry Run core. When the bank had advanced some 30-ft., the quarry run with some part of the larger stone on each side was bulldozed down to 1-ft. below Mean Sea Level and the specified grade of ¼—2 ton and ¼—6 ton was made up over the top to the +5.0 level. It was found extremely difficult to bulldoze the quarry run down to the specified −2.0 level and it was agreed that the works should be modified in this respect.

(b) **Wave Breaker Blocks.**

After the blanket of larger stones had been deposited over the core, blocks of the 6—12 ton grade were brought up and tipped on the seaward face. These wavebreaker blocks were tipped and bulldozed over the edge until the bank was made up to the designed width at the +5.0 level. The outer slope of the large stones so tipped did not approach the designed slope of 1 : 3 and the additional blocks required to make up the Contract section were placed by an electric derrick crane following up the construction described above.

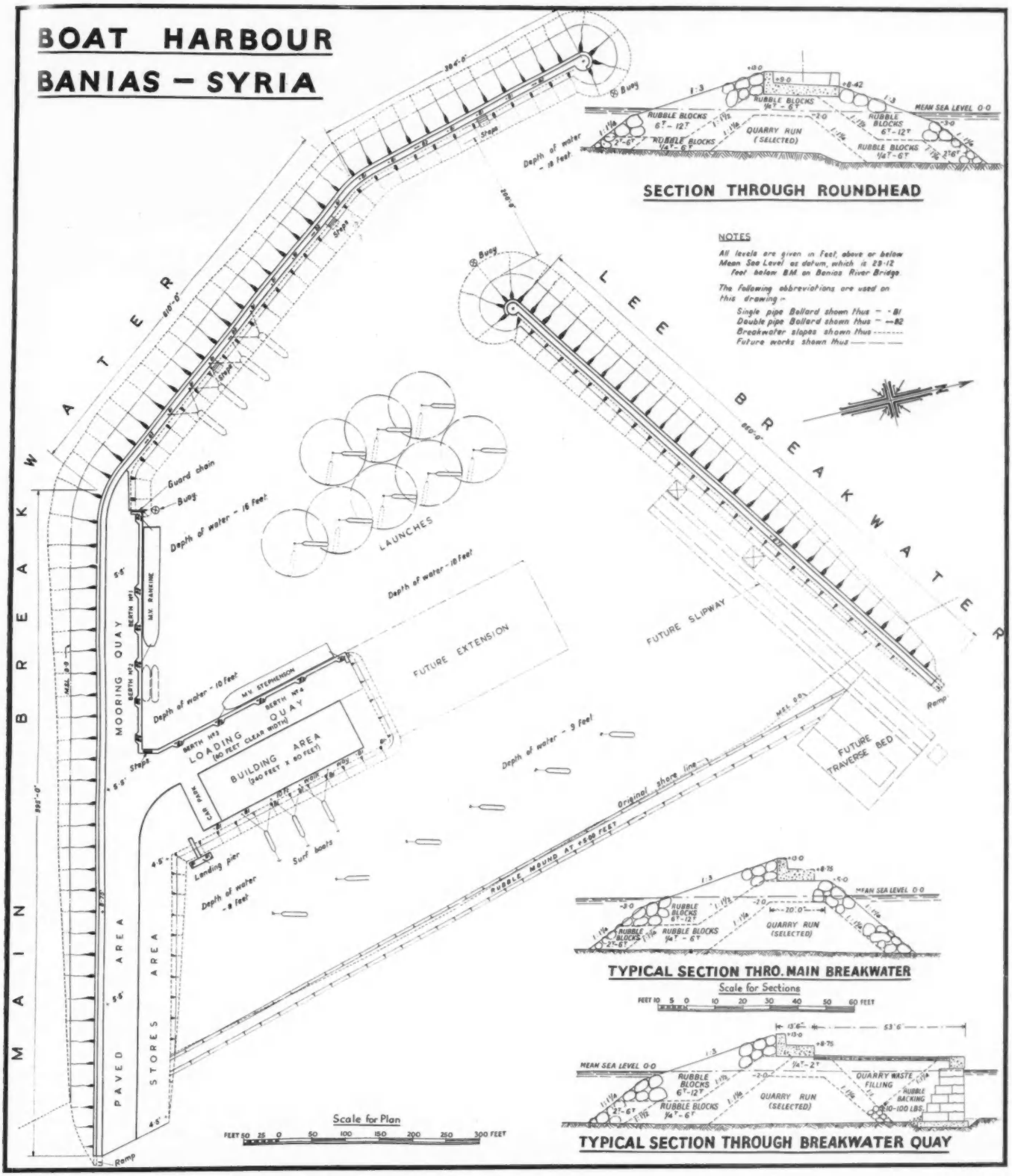
(c) **Modification of Design.**

It was found that the quantity of 6—12 ton blocks produced from the quarry was in excess of that needed to build the designed cross-section, and it was decided to dispense with the smaller grades specified on the seaward face below −10.0, these having been introduced in the design solely in order to conserve the necessary quantity of large stones for the part of the slope above −10.0 which is particularly susceptible to storm action. This modification was found to be of considerable assistance in constructing the breakwater.

(d) **Placing Wave Breaker Blocks.**

Every effort was made to ensure that the placing of the larger wave breaker blocks to the contract slope up to the +5.0 level kept pace with the construction of the bank at the outer end in order to limit the length of bank that might be damaged in the event of a storm. Once the decision had been taken to use a 15 ton 120-ft. jib derrick for the construction crane, it became necessary to locate the crane tracks at the +5 level, since at no higher level would there have been sufficient width for the crane. It was expected that during the winter storms the waves would be liable to over-top the breakwater and wash out the filling on which the rail tracks were balanced. To protect the crane against such disturbance it was arranged that the larger blocks should be piled on the seaward side of the crane; the blocks subsequently being used for the com-

Banias Boat Harbour—continued

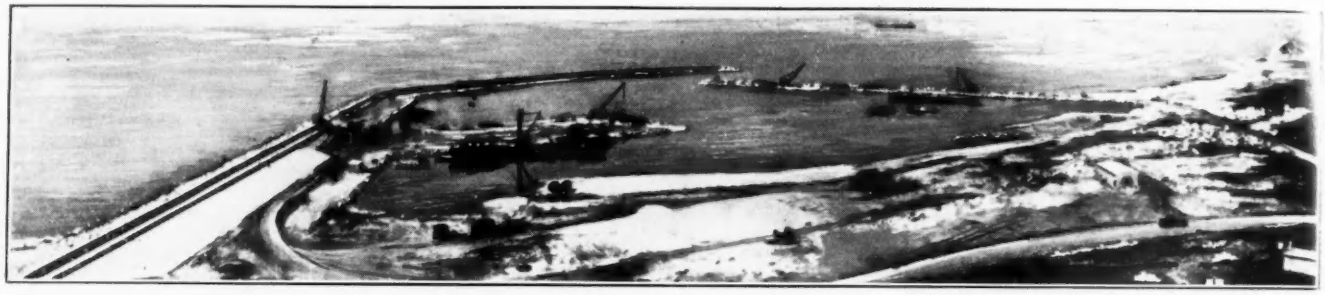

BOAT HARBOUR
BANIAS – SYRIA
SECTION THROUGH ROUNDHEAD
NOTES
All levels are given in Feet, above or below Mean Sea Level as datum, which is 29·12 feet below B.M. on Banias River Bridge.
The following abbreviations are used on this drawing :-
Single pipe Bollard shown thus – ·B1
Double pipe Bollard shown thus – –B2
Breakwater slopes shown thus ------
Future works shown thus —— —— ——
MAIN BREAKWATER
LEE BREAKWATER
MOORING QUAY
LOADING QUAY
BUILDING AREA
PAVED AREA
STORES AREA
LAUNCHES
FUTURE EXTENSION
FUTURE SLIPWAY
FUTURE TRAVERSE BED
RUBBLE MOUND AT +6·00 FEET
Original shore line
Guard chain
Buoy
Steps
Ramp
Landing pier
Surf boats
Depth of water – 16 Feet
Depth of water – 10 Feet
Depth of water – 9 Feet
Depth of water – 8 Feet
M.V. RANKINE
M.V. STEPHENSON
BERTH No 1
BERTH No 2
BERTH No 3
BERTH No 4
RUBBLE BLOCKS 6T – 12T
RUBBLE BLOCKS ¼T – 6T
QUARRY RUN (SELECTED)
MEAN SEA LEVEL 0·0
Scale for Plan
FEET 50 25 0 50 100 150 200 250 300 FEET
TYPICAL SECTION THRO. MAIN BREAKWATER
Scale for Sections
FEET 10 5 0 10 20 30 40 50 60 FEET
QUARRY WASTE FILLING
RUBBLE BACKING 10-100 LBS.
TYPICAL SECTION THROUGH BREAKWATER QUAY

pletion of the wavebreaker slope to the +13.0 level on the return journey of the crane.

(e) **Construction Seaward of Quay Walls—Parapet, etc.**

When the construction of the main breakwater had proceeded beyond the position of the quay walls a second derrick was erected to continue the breakwater construction, the first crane being transferred to the construction of the quay walls. The method of construction of the main breakwater was then continued to the roundhead, a mobile crane being used to assist the derrick, the mobile crane placing the 2—6 ton blocks to the +5.0 level and

Banias Boat Harbour—continued



Panoramic View of Harbour nearing completion.

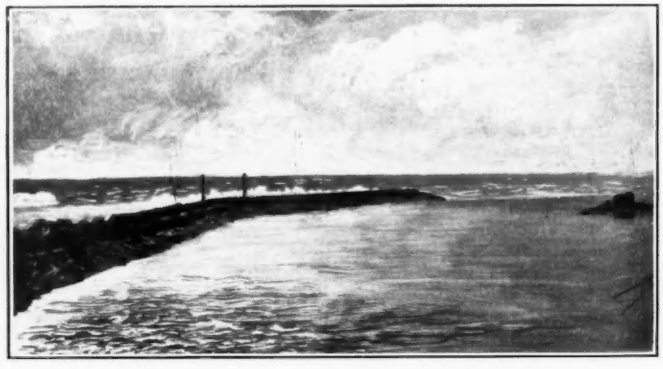
correct slope. On the completion of the roundhead to the +5.0 level the in situ concrete slab and parapet wall were built and the placing of the wavebreaker slope to the +13.0 level and completion of the inner slope to +5.0 were carried out during the return journeys of the derrick and mobile cranes respectively.

Construction of Lee Breakwater.

Construction of the lee breakwater commenced after the construction of the main breakwater was well advanced as this would afford some protection to the lee breakwater works. The method adopted for the construction of the lee breakwater was generally similar to that for the main breakwater described above, the one exception being that the protective layer of 2—6 ton blocks on either side of and over the top of the quarry run core was placed by tipping and dozing into position, and the 6—12 ton wavebreaker blocks on the seaward side were placed to the +5.0 level in a similar manner. The placing of the 6—12 ton blocks to the correct slope of 1 in 3 was not completed to the +5.0 level until the roundhead had been constructed to a size sufficiently large to accommodate a derrick crane, this crane then placed the outer wavebreaker blocks to the contract slope as it travelled shorewards.

Quay Walls.

The Breakwater Quay and Lighter Quay give a total of 695-ft. of quay wall, having a depth of water alongside varying from 9-ft. to 16-ft. The walls were constructed of precast concrete blocks weighing up to about five tons, laid on prepared foundations of rubble or concrete according to whether the sea bed is sand or rock. The blocks, being constructed of 1 to 8 nominal mix were placed generally in slice work laid at a slope of one horizontal to four vertical. The abutments and return ends of the quay walls were constructed in horizontal bonded blockwork with vertical joggle joints provided in the facing blocks formed of concrete. The concrete was filled in bags of slightly larger diameter than the joggle holes and the filled bags were then rammed into the joggle holes. Special " piano " blocks were used for joining the slice blockwork to the horizontal blockwork. All finished blockwork was weighted with a load equivalent to the mass concrete coping which was constructed after the rubble backing had been placed behind the wall and all settlement of the rubble base had taken place. Special top slice blocks were cast to a minimum thickness of 1-ft. and a maximum thickness of 3-ft. and used as required after the weighing blocks had been removed to take up variations in the sea bed and subsidence after construction. The top face of the completed blockwork varied between 6-in. and 2-ft. above Mean Sea Level and the top edge adjacent to the front face of the quay was cut back to permit a sand bond between the precast blockwork and the cast in situ cope. Bollards, boat rings and ladders were provided in both quay walls for mooring craft alongside the quay. The total quantity of precast concrete block in the quay walls was approximately 4,400 cu. yds. and in the cope a further 800 cu. yds. of concrete were placed.



View along Main Breakwater under storm conditions.

Reclamation.

Approximately three quarters of an acre of ground has been reclaimed bounded by the main breakwater on the south and the Loading Quay on the west. The remaining sides are bounded by a rubble reclamation dyke constructed from Class A blocks with a protective layer of Class C blocks. A crushed sealing layer some 3-ft. thick was placed behind the dyke to prevent the reclamation being washed through the dyke. Quarry waste was used for the filling behind the dyke, some 35,000 cu. yds. being used for this purpose. The reclamation is to be used for harbour buildings, storage area and approach roads to the Mooring and Loading Quays.

Quarry.

(a) **General.**

The quarry was situated in the Jobar Valley some 4½ miles from the Boat Harbour; the quarry site being located on the eastern side of the range of hills fringing the shoreline. A new approach road to the quarry had to be cut to provide satisfactory access. All the blocks had to be trucked up a steep section of road from the quarry to the summit before a clear run was obtained down to the Boat Harbour.

The limestone hills of Syria are in general shattered by earthquakes of the past and it is probable that the ordinary method of blasting off successive slices parallel to the working face would not have produced the large blocks specified in sufficient quantity. The heading system was therefore adopted as a result of which blocks of the correct size were obtained, but at the expense of some 35 per cent. more material, in the form of quarry waste, being brought down than was actually required for the breakwater construction. Some of this material was, however, absorbed in the reclamation for the building and storage area and some reclamation works which were carried out along the foreshore.

(b) **Method of Quarrying.**

The method of quarrying found to be most effective was to drive an adit into the face of some 35-ft. and then from its inner end to drive a gallery parallel to the face for the length of face to be blasted, with chambers for concentration of exposive at intervals of about 20-ft. Black powder was used for the main blasts after which 40 per cent. gelignite was used for such secondary blasting as was found to be necessary to break down the oversize blocks and for clearing the toe of the face.

Each chamber was charged with approximately one ton of black powder and for a blast where five chambers were used some 50,000

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Holland's Sea Defences

Ambitious New Scheme of Coastal Protection

By Ir. C. van AMERONGEN.

It will be recalled that during the night of January 31/February 1, 1953, a severe storm, occurring in conjunction with a spring tide, caused an unprecedented rise in water level along the whole coastline of Holland and especially in the tidal inlets and estuaries in the south-western part of the country. Whereas the sea defences of most of the northern and western parts of Holland consist of naturally formed sand dunes, the numerous islands forming the complex delta of the rivers Rhine, Meuse and Scheldt have to rely mainly on man-made dykes for their protection against the inroads of the sea. Some of these dykes are centuries old and, though adequately maintained and constantly inspected by the responsible authorities, they were unable to cope with the exceptional water levels of that fateful night and failed in a number of places.

As a result of this failure of the dykes, about 400,000 acres of land in the provinces of Zealand, North Brabant, and South Holland were flooded by the sea. About 1,800 people lost their lives and damage estimated at between £100 and 200 million was caused.

Serious though the disaster was it could have been much worse, and at once emphasised the necessity of a complete review of future sea-defence policy. Almost 50 per cent. of the total area of Holland—inhabited by about 60 per cent. of the population—lies below normal high water level and would be liable to flooding in the absence of sea defences (dunes and dykes). Indeed at one stage during the late floods, there was considerable danger of failure of certain important dykes in the Rotterdam area, which would have led to inundation of most of the central part of the country. As this is the most densely populated and, from the economic point of view, most important part, the consequences would have been catastrophic.

The task of studying ways and means to ensure the future safety of the south-western islands and, indeed, of the country as a whole, and of proposing suitable schemes for effecting this purpose was entrusted to the Delta Committee. This is an advisory committee of ten experts under the chairmanship of the Director-General of the Netherlands State Waterways. They recently presented their Third Interim Report, which contains clear-cut proposals with a view to preventing a recurrence of the disaster.

Although the floods were caused by exceptionally high water levels, the experts realised that by no means the worst possible combination of adverse factors had occurred at the time. It is, in theory at least, possible for even higher levels to occur, and there is no guarantee that mere repairing and strengthening of the dykes will be sufficient to prevent the islands from being flooded again at some—perhaps very remote—future date.

For obtaining really adequate protection, it would be necessary not only to strengthen the dykes, but to increase their height by at least 5-ft. or 6-ft. Such a solution would present great problems. For one thing, houses and other buildings are at many places built on and beside the dykes. Such structures would in most cases have to be expropriated and demolished. As the dykes would have to be widened as well as raised, there would moreover be a fairly considerable loss of arable land along the landward side of the dykes. Many of the existing dykes are unreliable in places, e.g. due to defects in the subsoil or in the dyke embankments themselves. These lurking defects repeatedly manifest themselves in slip or subsidence phenomena. Besides, there is at some points the danger of scouring of the toe of the seaward slope by the strong tidal currents. It is therefore obvious that strengthening and raising of the existing dykes is a somewhat problematical procedure, besides being a very costly one, which should be resorted to only in cases where no better alternative solution is available.

In their Third Interim Report, the Delta Committee put forward a different and far more effective scheme for obtaining the desired measure of protection. This scheme consists, essentially, in closing the mouths of several of the tidal inlets and estuaries by means of great dams. These inlets, which penetrate deeply into the country, are recognised as the chief source of danger from the point of view of flooding. By this proposed damming-off of their mouths they will be converted into comparatively tranquil "lakes" in which the salt water will gradually be replaced by fresh-water from the rivers flowing into the delta.

The existing dykes will not be rendered redundant, but will remain available as a valuable second line of defence.

The only disadvantage attaching to this bold new scheme is the destruction of the centuries-old oyster and mussel industry which flourishes in the estuaries and inlets. Against this, there is an impressive array of advantages. Instead of a long and complicated system of dykes of varying age and strength, the main defences will consist of a short, closed, comparatively straight coastline consisting of natural dunes (these occur at the western extremities of the islands involved in the scheme) linked by dams. Such a system of sea defences will be far less vulnerable, besides being simple to inspect and maintain.

The dams will, in addition, provide a convenient means of communication between the islands, which is expected to yield certain economic advantages. The fresh-water reservoirs formed by the dammed-off estuaries will be beneficial to agriculture in the surrounding areas and will facilitate the problem of domestic water supply in the south-western part of the country. Navigation on the enclosed stretches of water will be simpler and safer, and it is anticipated that the various small ports situated on these waterways will, on the whole, benefit by the scheme.

As regards the problem of domestic water supply this is also one of Holland's most pressing troubles. Dutch farming is suffering from a growing shortage of fresh water, due to increasing inroads by salt. This salt increase is the result of a number of different factors, the one most difficult to deal with being the gradual rise of the sea level combined with the slow subsidence of the soil. In the next ten centuries the soil of Holland will sink by a total of 2½ metres.

The continuous process of soil subsidence has the effect of bringing the level of sub-soil fresh water constantly lower and lower in its relation to the sea level, so that there results a salt seepage against which nothing will help except the inflow of more fresh water.

Banias Boat Harbour

(continued from previous page)

tons of limestone were brought down; 65 per cent. of this quantity was usable in the breakwater construction and about 20 per cent. was of the 6—12 ton grade.

Power shovels were used for picking up the rock, these machines being supplemented by a mobile crane using wire rope slings for handling the 6—12 ton blocks, and such of the smaller blocks as the shovel bucket would not handle. Selection of the rock into the required grades was made by the shovels assisted by a D.8 bulldozer as necessary. The system of loading by shovel is not ideal as the shovel is only able to select the various grade approximately from the heap at the face, but as the work progressed the operators became more efficient and a satisfactory degree of selectivity was achieved.

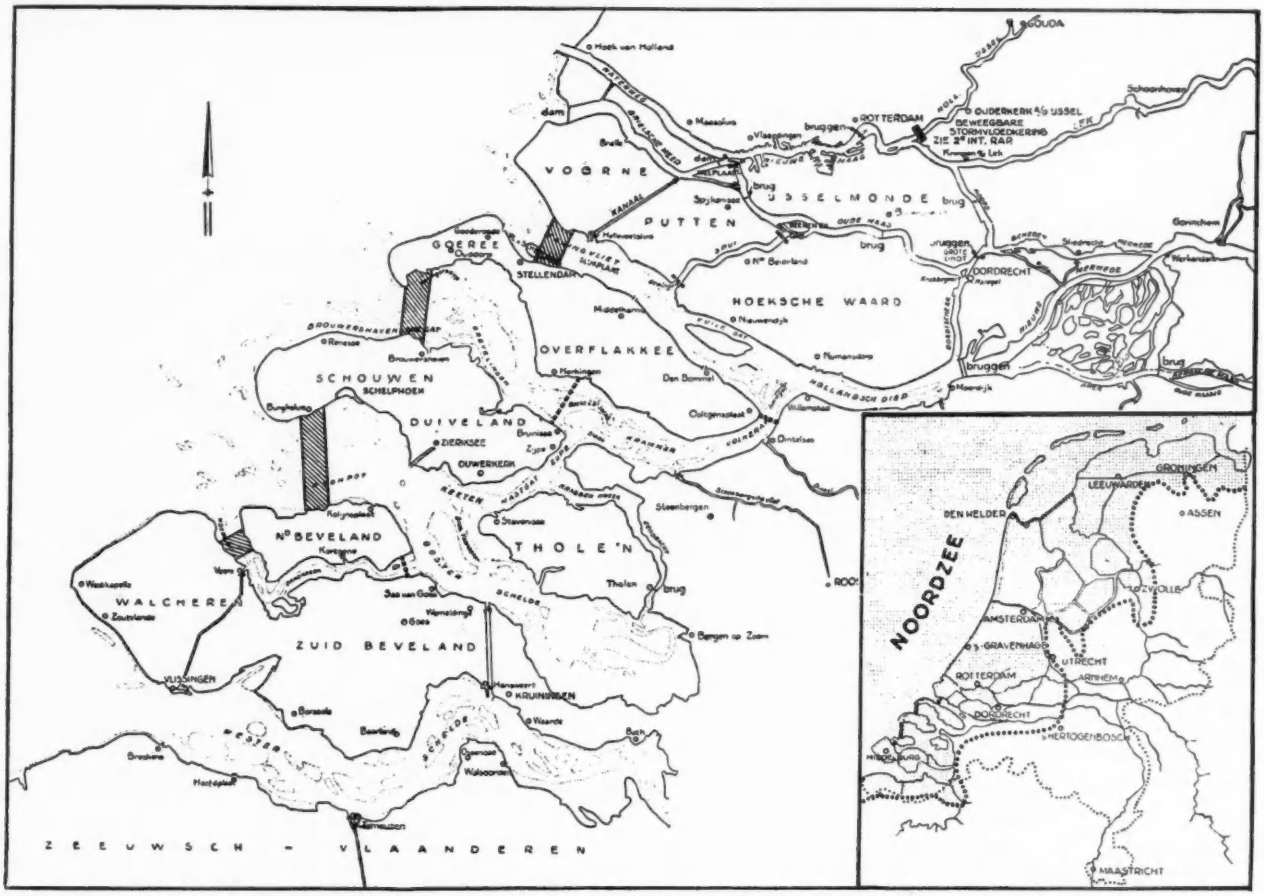
(c) **Transport.**

A fleet of Euclids was used for the transporting of all grades and quarry waste to the harbour works, the vehicles being clearly marked by a detachable label showing the grade of stone which they were to contain. The quarry output had to be geared to meet the demand of the main and lee breakwater construction programmes; 10,000 cubic yards of rock were required per month and to maintain this output two power shovels, a mobile crane and D.8 bulldozer were employed at the quarry, and a daily average of 5.5 loads per truck was maintained.

The design of the boat harbour was carried out by Rendel, Palmer & Tritton, Consulting Engineers to the Iraq Petroleum Company, Limited, the contractors being Messrs. John Laing & Son, Ltd., with Meid-ud-Din Bey Jabri.

Mr. R. C. Melville, B.Sc., A.M.I.C.E., was Resident Engineer for the Consultants and Mr. A. J. Alban Agent for the Contractors, assisted by eleven British staff. It is recorded with regret that Mr. R. C. Melville, Resident Engineer, died immediately before he was due to leave Syria for U.K. on completion of the contract.

Holland's Sea Defences – continued



Map of Holland showing the positions of the proposed Main and Secondary Sea-defence Dams across the Estuaries, also the Ijssel River Barrage Dam. In the smaller map the shaded land area is that part of the country lying below high water level which would be flooded in the absence of sea-defences.

The greatest danger lies in the river estuaries, where each tide brings in masses of sea water. This, being heavier than the outflowing river water, sinks to the bottom and deposits a layer of salt which creeps every year 250 yards further inwards.

In addition to this, every time the IJmuiden northern lock is opened, 3,500 tons of salt enter the North Sea Canal.

This salt invasion should be countered by rain and the normal flow of the Rhine and the Meuse. Unfortunately, it is when the Rhine falls to its lowest flow in the summer, that Holland's needs of fresh water are at their maximum.

The situation is expected to worsen in the future through the effects of deforestation in Germany.

When the land reclamation of the IJsselmeer has been completed there will remain a lake of 1,250 square metres, containing 260 million cubic metres of fresh water. To use this as a reservoir (capable of being increased to 400 million cubic metres) it will be necessary to canalise the Rhine, so that the water now lost during the winter could be diverted into the lake via the IJssel River. This, in its turn, would mean that the course of the river would have to be altered and certain bends straightened out.

The closing of the sea arms proposed by the Delta Committee will put an end to the salt invasion from the outside which gives rise to so many troubles.

It will not, of course, be possible to close the estuary of the River Scheldt (giving access to the port of Antwerp) nor the Rotterdam waterway. These will have to remain open for seagoing shipping and for the discharge of river water into the North Sea. It is proposed to strengthen and raise the dykes along these two waterways.

In addition to the main dams across the mouths of the estuaries, it will be necessary to construct certain secondary dams and a number of civil engineering works of various kinds.

The execution of the scheme is estimated to cost between £150 and £200 million and will take 20—25 years to complete. The Committee are, however, convinced that the scheme is quite feasible, both from the technical and the economic point of view, and consider it the only reliable solution for ensuring future safety against flood disasters. (The cost of raising the dykes around all the islands would be of the same order of magnitude. The same is true of the time required for carrying out the work.)

Construction of the dams presents considerable engineering problems. Owing to the strong tidal currents in the estuaries, there are per 24 hours only four short periods of comparatively calm water in which to carry out engineering operations which call for such conditions. It is obvious that efficient and expeditious execution of the work will necessitate a considerable concentration of contractors' plant and great skill on the part of the engineers and men on the job. The Dutch engineers and contractors have, however, in the last decade or two, acquired a great deal of valuable and, in some cases, unique experience in the course of such major civil engineering operations as reclaiming large areas of the former Zuyder Zee, repairing the war-damaged Walcheren dykes and, latterly, closing the gaps in the dykes damaged during last year's floods. This great store of experience, in conjunction with modern engineering methods (e.g. the use of caissons and special techniques involving the use of asphalt products), will enable the Dutch engineers to undertake their great task with complete confidence of success.

On the basis of data derived from observation and tests carried out in the hydraulics laboratory it is possible to make fairly accurate predictions of flow conditions, water levels, etc., during the construction and after completion of the dams, and there can be little doubt that the proposed engineering works will yield the results expected of them. With this end in view, the Dutch nation will not object to the extra burden which the execution of the scheme will impose on their national economy.

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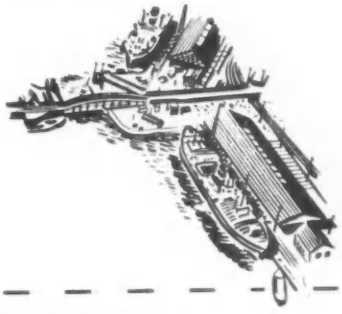

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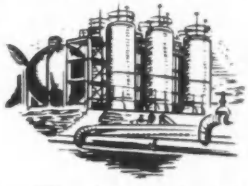

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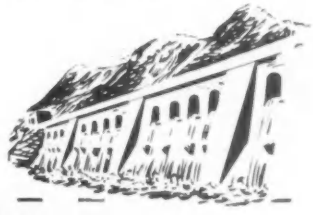
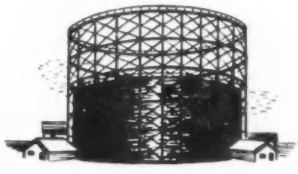


IN THE GAS INDUSTRY



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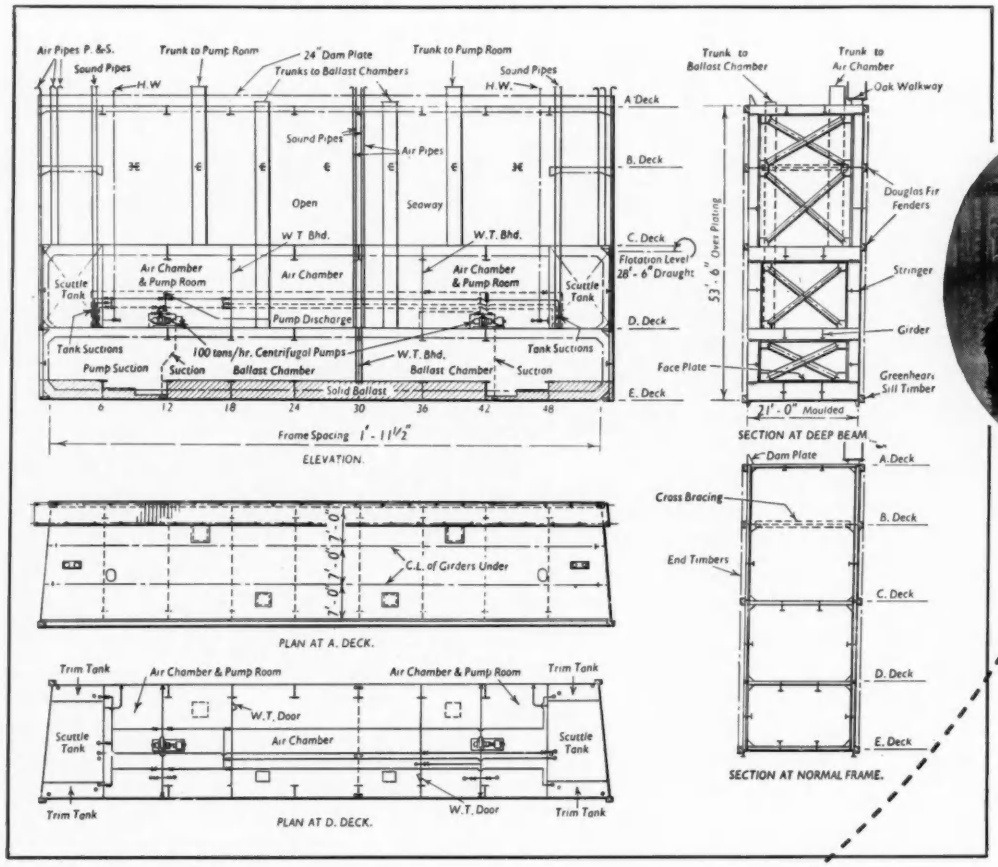
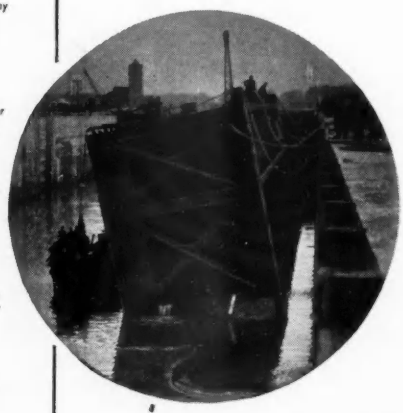
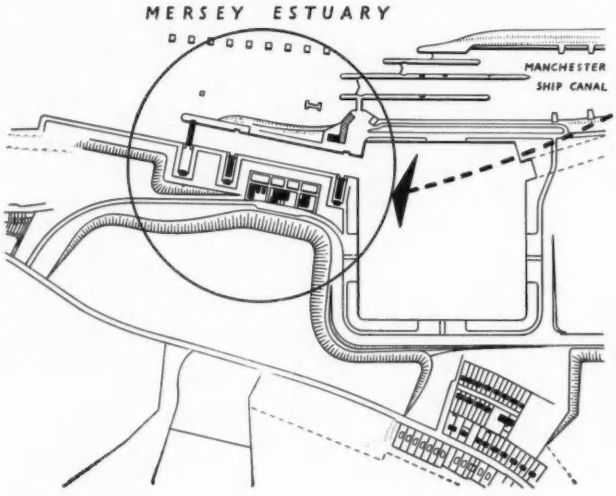




Uprighting Caisson Gate at entrance wall of the Manchester Ship Canal Company's new Oil Dock at Eastham.



The "Queen Elizabeth II" Dock

Three Vickers-Armstrongs sliding caissons form an essential part of the Manchester Ship Canal Company's new Oil Dock at Eastham on the Mersey Estuary. They are part of an entrance lock into the main dock. Their all-welded steel construction displaces some 1700 tons. Each is 106 feet long, 23 feet wide and 60 feet deep. There will be a total water pressure on a caisson of approximately 5000 tons when water is up to the top deck on one side and it is dry on the other. The Caisson operating machinery has also been manufactured by Vickers-Armstrongs, including the 'VSG' variable speed hydraulic gears.

Vickers-Armstrongs were pioneers in the adoption of the "all-welded" technique of caisson construction. Further information is given in the publication "Dock Gates, Caissons and Pumps," a copy of which will be sent on request

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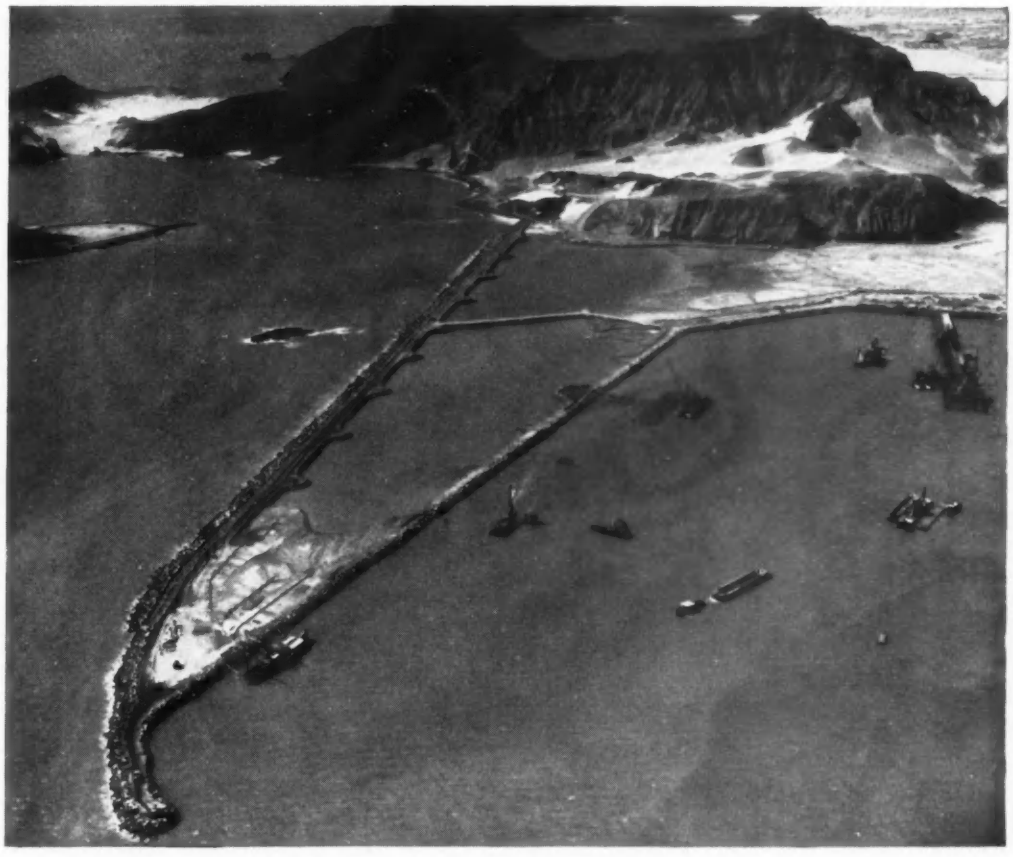

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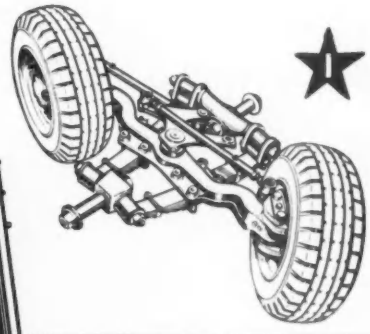

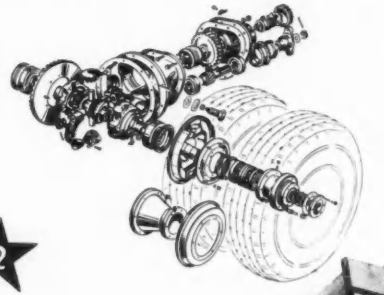

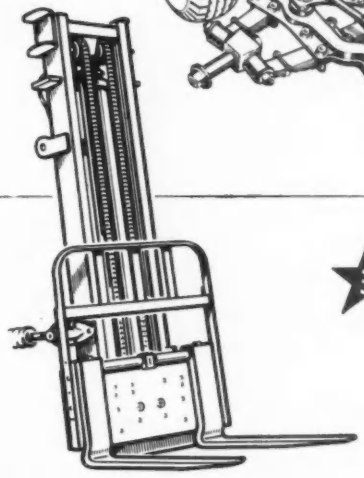

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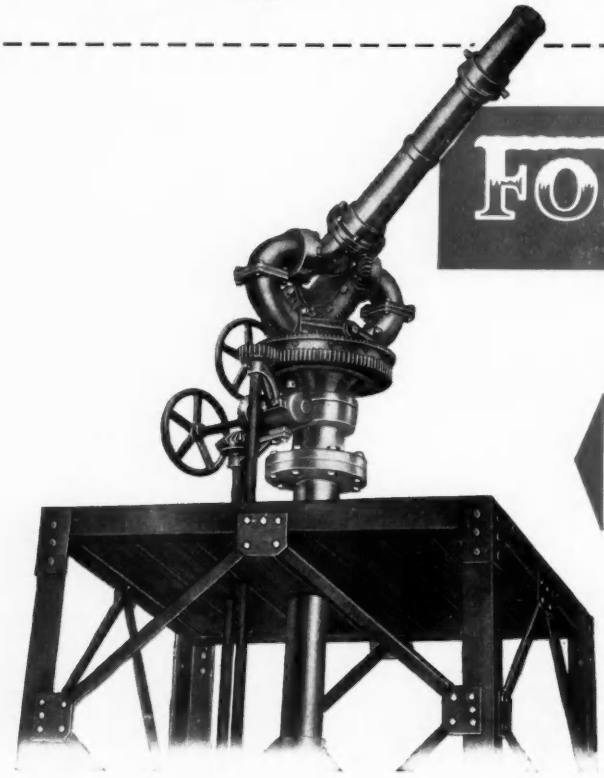

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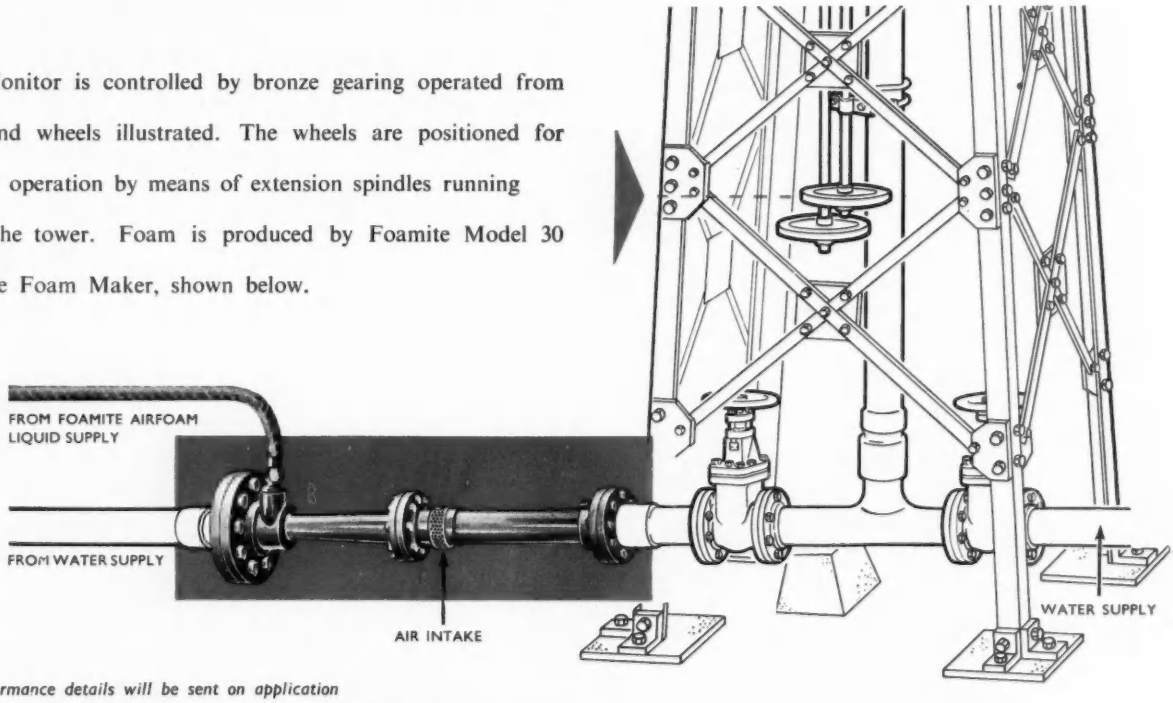

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Inland Waterways in the North-East of England

By J. TASKER (Personal Assistant to the Divisional Waterways Officer, British Waterways, North Eastern Division, Leeds).

INTRODUCTION

This article, which substantially reproduces a paper delivered before the Hull centre of The Institute of Traffic Administration and which is reproduced by kind permission, outlines the inland waterway resources of the North Eastern Division of British Waterways (see Map of English Waterways, Fig. 2). At the time when the author, who is an Officer of the British Transport Commission, originally gave his address the Inland Waterways in this area were operated by the Docks and Inland Waterways Executive; since then, the functions of this Executive have been taken over by the Board of Management of the Transport Commission. At the conclusion of his address, the author stressed that the Transport Commission, having studied the possible contribution that the English canals could make to the transport needs of the country, had published a Statement of Policy specifying the traffic which can most economically be transported by inland waterway. This policy statement has already been reported on several occasions in this Journal, and has recently been fully explained in the article by the Chairman of British Waterways, Sir Reginald Hill in the December 1953 issue.

One feature of particular and general interest is the system of coal transport in barges appropriately called "Compartment Boats." With this ingenious and efficient system, handling of the coal is reduced to a minimum, as can be seen from the illustration (Fig. 1); coal is brought from the colliery in the compartment upon a length of railway track, and is launched into the water; transshipment at this point is thus eliminated. A train of these box-like barges are then towed to Goole Docks, with a total cargo of about 700 tons but with a crew of only four men. A "cut-water" or dummy bows is tightly bound to the fore end of the train of compartment boats, themselves chained close together, to reduce resistance in haulage, and to disperse the wash from the tug. At Goole Docks, each compartment is hoisted and tipped into the hold of the sea-going vessel. A round trip from colliery to Goole and back is completed in about 24 hours, the total distance being about 50 miles.

At this time, when increasing interest is being shown in the possibility of greater and economic use of canal transport in Great Britain, the work of the North Eastern Division of British Waterways is especially stimulating. Editor—*Dock and Harbour Authority*.

There is still a tendency to regard inland water transport as something primitive and out of date. This is due to ignorance of present-day conditions, where hauling by horse has been almost entirely superseded by modern craft, many of which are fitted with diesel engines giving them a mobility which permits a great economy of time in transit. Being independent even of tugs, they can proceed on their journey immediately loading or discharge is completed.

Petrol and petroleum products in particular lend themselves to water transport. In the North Eastern Division there are many tank craft specially designed and constructed for the transport of oils in bulk which load mainly at installations on the River Humber, and carry cargo to waterside depots inland where discharge by pumping plant is very rapid and a round trip say to Leeds can often be made well within 36 hours.

Whilst coal constitutes the largest single item in our traffic returns, it should not be thought that water transport is suitable only for traffic in bulk. Many different items of general merchandise, such as grain, sugar, cement, wool, paper and machinery, to mention only a few, are regularly and successfully carried.

Ownership of Canal Craft.

The handling of traffic on waterways falls principally into two categories—firstly, there is the private owner of craft who quotes a conveyance rate covering all services rendered to his customers, and merely pays to the Executives a toll for the use of the waterway. Navigation tolls which, incidentally, are subject to statutory control, are based on a classification contained in the Order Confirmation Acts of 1893-4 being calculated at so much per ton per mile, generally tapering off as the distance increases.

Secondly, on certain waterways (the Aire and Calder and Trent systems), the Executive operate as carriers for which purpose they own a fleet of boats and can quote an inclusive rate for the collection of a consignment from the sender's premises, conveyance by water and final delivery to the receiver. The Executive have warehousing facilities at certain of the larger towns served by water, also a number of road motor vehicles for distribution from water-head depots.

In the early days of rail transport, private owners operated their own engines and wagons in competition one with another. However, this developed into such keen rivalry that the Railway Companies were obliged, for safety reasons, to call a halt and reserve to themselves the provision of motive power, but for certain special traffic private wagons are still a feature of railway operation.

On our inland waterways by far the greatest proportion of traffic is carried by craft independently owned and operated.

Compartment Boats.

The compartment boat system is peculiar to the North East and consists of steel box-like craft each capable of carrying about 35 tons of coal. They are towed in trains of nineteen by steam tugs with a crew of four men, the coal being loaded at waterside staiths and then conveyed to Goole Docks, where each compartment is lifted by hydraulic hoist, the contents being tipped into seagoing vessels (see Fig. 1).

In the year 1923 nearly one and a half million tons of coal were carried from West Yorkshire Collieries by this method which has proved a very economical one. Unfortunately, these pre-war figures have not been achieved since 1945 due to the national coal situation and the consequent limitation of exports.

Through Traffic to Other Canals.

In the 1906 Royal Commission on Canals considerable emphasis was laid upon the lack of a standard gauge of canal in this country, and it is true that this factor has in many cases mititated against the development of long distance traffic. At the same time, however, it should be pointed out that for many years craft have passed freely between the Aire and Calder Navigation and the Leeds and Liverpool Canal, the Calder and Hebble Navigation, the New Junction Canal, and the Sheffield and South Yorkshire Navigation, between all of which there were voluntary through toll arrangements to facilitate traffic, so that one composite figure per ton could be quoted from the point of origin to destination.

It is the Executive's policy now for tolls in all cases to be collected right through to destination by the Division in which the traffic originates.

Varied Types of Industry Served.

An indication of the value placed upon water transport is given by the varied types of industry located on the waterside, namely, glass and pottery manufacture, flour mills, paper mills, soap and chemical works and seed crushing mills, apart, of course, from such public services as gas and electricity undertakings. As owners of much land on the waterside, the Executive are able to lease sites for new industrial development calculated to augment water-borne traffic.

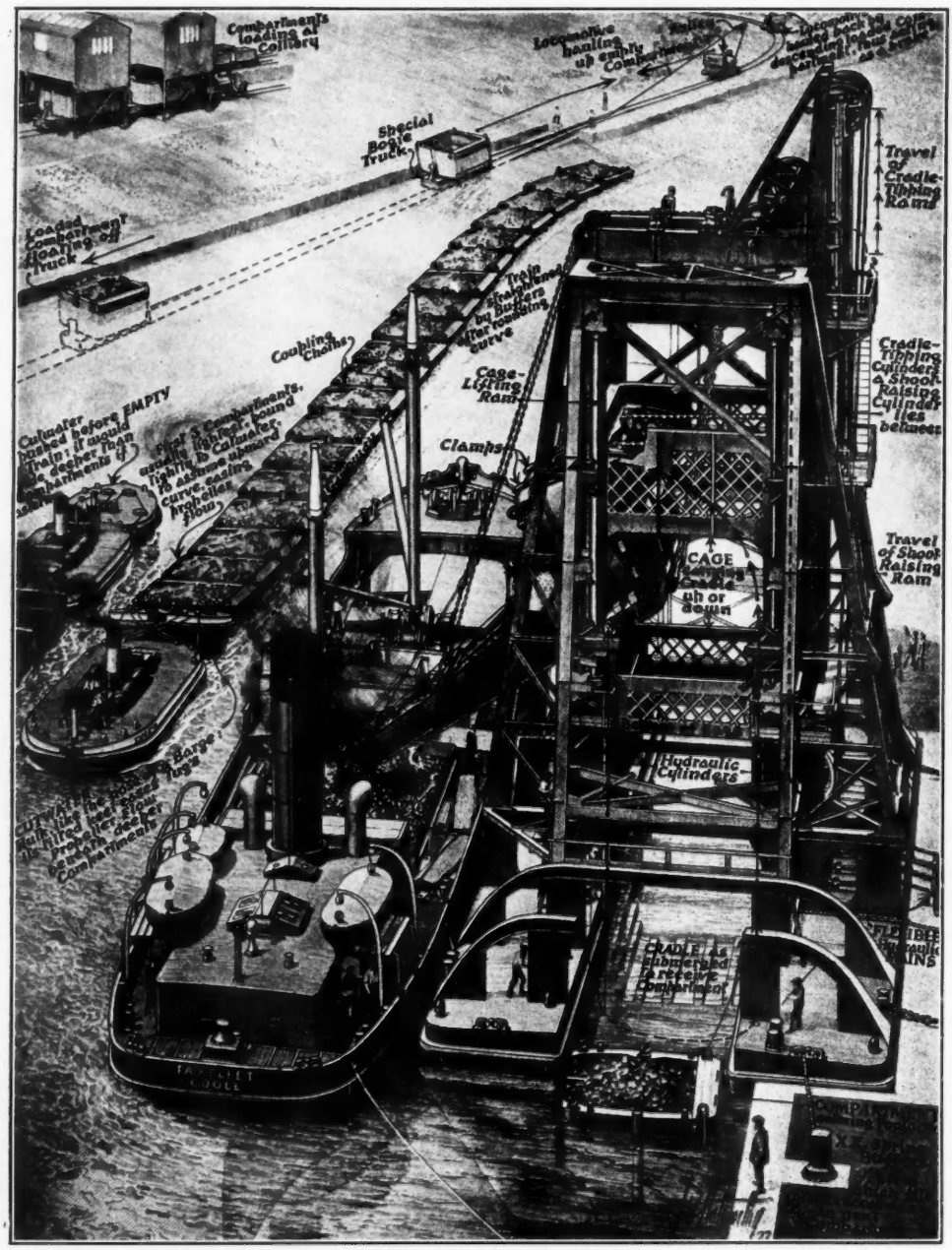
The development of power craft in recent years has stimulated boat building considerably, and there are flourishing construction yards situated on the waterside; one being over 50 miles from the sea, where craft up to 350 tons carrying capacity are built and launched, principally for service on estuarial waters in various parts of the country.

On the commercial side, every endeavour is made to keep in close contact with traders to bring water transport facilities to their notice, and to assist with their problems, particularly with those associated with the transport of both raw materials and finished products.

Engineering Organisation and Works.

Engineering duties cover the day to day maintenance of canal banks, locks, premises and handling equipment, together with,

Inland Waterways in the North-East of England—continued



[*By courtesy of the British Transport Commission*

Fig. 1. Diagrammatic illustration of the Compartment Boat System in use on the Aire and Calder Navigation. The method of loading and launching "compartments" and their discharge at Goole Docks, 25 miles away, are both shown, together with an illustration of a loaded train en route.

of course, adequate water supply. Where natural drainage facilities are inadequate for navigation purposes, water supplies have to be maintained from reservoirs by pumping.

The organisation of the Divisional Engineers' Department comprises District Engineers, District Inspectors and Local Inspectors whose prime duty it is to ensure the waterways being maintained in navigable and watertight condition; this requires a regular programme of dredging.

There are also electrical and mechanical engineers for the maintenance of power plant and its periodical overhaul, as well as repair yards for the overhaul of Executive-owned craft and the regular inspection and testing of chain gear, etc.

The periodical overhaul and renewal of lock-gates and swing bridges is wherever practicable scheduled for Bank Holiday weekends in order to cause the minimum inconvenience to traders and delay to traffic. Often this important maintenance work proceeds continuously day and night for 72 consecutive hours.

As and when traffic handling plant becomes due for replacement, consideration is constantly being given to the possibility of introducing new methods of mechanisation to expedite the operation, thus tending to lower costs.

Another factor which sometimes presents difficulty is subsidence due to coal workings. Although statutory provisions do afford certain protection, it is a costly item, particularly in the West and South Yorkshire coalfields.

Fossdyke and Witham Navigations.

Historically, the Fossdyke Navigation is probably the oldest, although it has had a very chequered history and has not a continuous record of transport facilities. It is believed to have been partially developed by the Romans, but later fell into decay. It connects the River Trent at Torksey with the City of Lincoln, a distance of eleven miles.

When Parliament passed an Act in 1670 authorising improvement of this waterway, one of the chief objects stated was to restore to Lincoln a measure of the prosperity which it had formerly enjoyed but which had suffered greatly when the Navigation fell into disrepair.

By this Act, the Corporation of Lincoln took over responsibility but the waterway deteriorated again later with the result that in 1740 a substantial portion of the dues chargeable by Lincoln Corporation were leased to a Mr. Richard Ellison in return for his undertaking to restore and maintain the navigable channel.

For over a hundred years Mr. Ellison and his successors faithfully discharged their responsibilities until in 1845 the Great Northern Railway Company leased the channel of the Fossdyke Navigation for a period of 894 years.

The Docks and Inland Waterways Executive took over the Fossdyke from the Railway Executive in June, 1950, on which date the adjoining Witham Navigation was also transferred.

The latter waterway runs from Lincoln to Boston, a distance of some 32 miles, and is thought to have originally been a tideway navigation for sea-going ships.

The first Act of Parliament relating to the Witham was in 1670, empowering the Corporation of Lincoln to improve the river and to levy certain tolls. These powers, however, were not used.

A later Act of 1762 set up a body of Commissioners of Navigation who were, in turn, superseded by the Proprietors of the Witham Navigation under an Act of 1812.

In 1846 the estates and interest of the Proprietors were leased to the Great Northern Railway Company for 999 years.

Although neither the Fossdyke nor the Witham carry dense traffic, these waterways do provide a valuable link with Hull and the River Humber generally via the River Trent.

Inland Waterways in the North-East of England—continued

Aire and Calder Navigation.

Next in order comes the former Aire and Calder Navigation, serving Goole, Leeds, Wakefield and Selby, having its origins in an Act of 1698.

It was directly due to the development of inland water transport generally and to the construction of the Knottingley and Goole Canal in particular, that the latter town was declared a port in 1828. Previous to then Goole had been little more than a comparatively insignificant fishing village on the banks of the Ouse.

Population figures for Goole admirably illustrate its remarkable development consequent upon the completion of the canal named. Whereas the inhabitants numbered 508 in 1821, this figure was nearly quadrupled to 1,965 ten years later and in 1841 the population had grown to 3,629. The latest census figure in 1951 was a little under 20,000.

From its earliest days, the Navigation Authority followed a considered policy of improvement, schemes of modernisation being constantly adopted which enabled the undertaking to meet and withstand railway competition. With this end in view successive directors consistently followed a very prudent and restrained dividend policy in order to put aside sums for various development schemes.

From time to time locks were lengthened to enable craft to pass through in greater numbers (in some instances eight vessels can now pen together), canal banks were strengthened to enable the operation of power craft without detriment to works and awkward river bends were eliminated.

Many of these improvements were made under the Aire and Calder Act of 1828 and the total cost is recorded as £538,535. If this is related to present-day money values, it is roughly equivalent to over two million sterling, a remarkable act of faith in the future of inland water transport.

Furthermore, much of this development work took place when constant vigilance was necessary to watch the Navigation's interests in competitive railway schemes.

For instance, in the 1845 Session of Parliament, no less than 19 projects had to be watched and in many cases the Navigation's Parliamentary Agents had to fight for the insertion of protective clauses respecting bridge crossings and kindred matters.

Although the Navigation Authority under the powers of the Canal Clauses Act of 1846 themselves carried merchandise for the public at large, they refrained from a rate-cutting war with bye-traders who have been afforded every assistance in the development of their business. This happy relationship still continues.

Calder and Hebble Navigation.

The Calder and Hebble links the Wakefield terminus of the Aire and Calder system with Huddersfield and Sowerby Bridge.

It was constructed under an Act of 1758 and provided a very useful medium for the conveyance of grain and general goods ex the Humber to the various towns in the Calder Valley. The principal traffic on the canal now is coal, although Executive warehouse facilities for merchandise are available at Brighouse and Sowerby Bridge.

Sheffield and South Yorkshire Navigation.

The other principal waterway in Yorkshire with considerable traffic is the former Sheffield and South Yorkshire Navigation which really represents an amalgamation of four smaller undertakings, viz., the Stainforth and Keadby Canal (1793), the River Dun Navigation (1725), the Sheffield Canal (1815) and the Dearne and Dove Canal (1793).

The executive acquired with this undertaking, excellent warehouses at Doncaster and Sheffield through which a considerable amount of traffic constantly passes.

This system serves the important South Yorkshire coalfields, several collieries having waterside loading facilities.

Early in the present century, the New Junction Canal, 5¾ miles in length, was constructed connecting the Aire and Calder with the Sheffield and South Yorkshire, thus giving a direct stimulus to through traffic to and from the Port of Goole. This incidentally is the last stretch of canal to have been constructed in this country.

Brief mention may be made of the Ripon Canal and River Ure Navigation acquired from the former L. and N.E.R. Commercially they are of little account and carry only a very small local traffic.

The Executive, as successors to the former Aire and Calder Navigation, are Conservators in respect of a stretch of ten miles of the Ouse in the vicinity of Goole ; above which a navigable length of some 43 miles is under the jurisdiction of York Corporation as Conservators and Trustees of the River.

The River Trent.

Turning to the Southern Section of the North Eastern Waterways the former Trent Navigation is outstanding. It extended from Wilden Ferry in Derbyshire to Gainsborough, a distance of some 69 miles. Below Gainsborough incidentally, the River Trent comes under the jurisdiction of the Humber Conservancy Board.

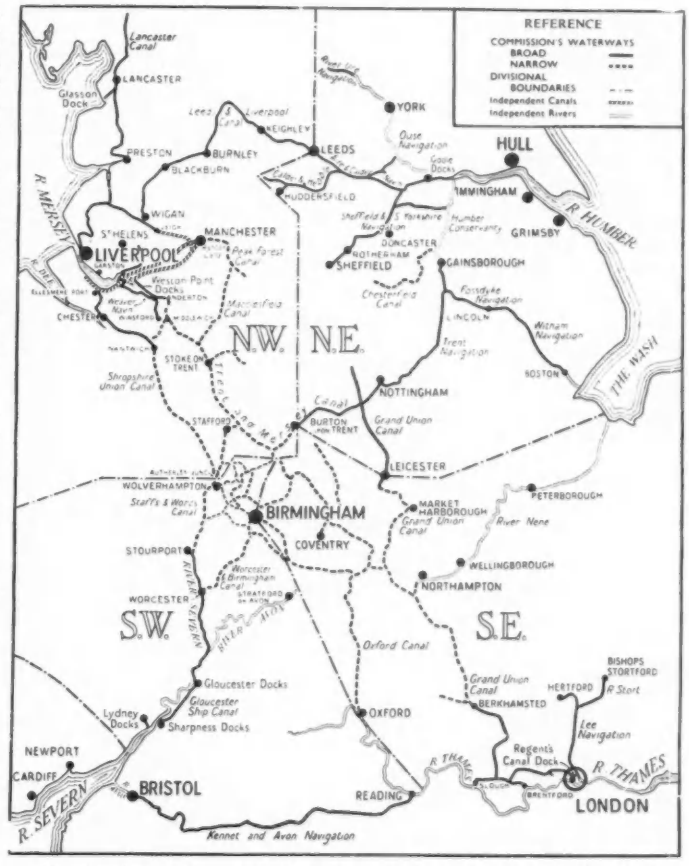


Fig. 2. Map of Canals in Great Britain, showing those in the North Eastern Division and their connection with other waterways.

For many years the Trent has enjoyed an appreciable volume of traffic, a fair proportion being merchandise imported via Hull destined for the various industries of the Midlands in general and Nottingham in particular.

Oils in bulk are also an important item on the Trent, many of the distributing companies having inland waterside installations for the reception of traffic from tank barges.

The Corporation of Nottingham interested themselves in the Trent Navigation and under an Act of 1915 took over a stretch of 20¼ miles in order to execute certain improvement works which the Navigation Company had planned but were unable to execute (mainly for financial reasons).

Connections with Canals in Other Areas.

There is a through route from the River Trent to Birmingham and the Midlands via the Trent and Mersey Canal of which a small section from Burton-on-Trent eastwards falls in the North Eastern Division.

Inland Waterways in the North-East of England—continued

Fig. 3. View of new lock at Newark, showing old lock on right.

Soon after its construction, under various Acts (the earliest being 1766), the Trent and Mersey (or as it was sometimes called the Grand Trunk Canal), enjoyed years of great prosperity but it declined rapidly with the advent of the railway.

At one time a great amount of traffic between the East and West Coasts was carried by this route, but with the better facilities available via the Aire and Calder, the Calder and Hebble and the Rochdale, a proportion was diverted from the Trent and Mersey route as for most of its length it is a narrow canal accommodating only boats up to seven feet beam and this no doubt has been an important factor in the canal's decline.

West of Burton, the Trent and Mersey Canal comes within the North Western Division of the Docks and Inland Waterways Executive.

The River Trent also has a through connection with London via the former Grand Union Canal, the North Leicester Section of which is administered by the North Eastern Division.

Narrow Canals.

The Chesterfield Canal 46 miles in length, and authorised by an Act of 1771, was constructed to open out commercial relations between Chesterfield, Worksop, Retford and the Port of Hull, and also to obtain easy access to collieries and limestone quarries in Derbyshire. It connects with the River Trent at Stockwith.

This waterway was later acquired by the Manchester, Sheffield and Lincolnshire Railway Company.

It is a narrow boat canal, and is only navigable now for a limited portion of its original length. There is very little traffic on the Chesterfield Canal.

Of the other undertakings there remain the Pocklington, Cromford, Nottingham and Grantham Canals, but navigation of each of these was abandoned prior to their vesting in the Executive.

Of this subject it need only be said that in the early days of the canal era, there was much optimism in projecting schemes which proved unable later to compete economically with rail transport facilities. It would be unfair to criticise the promoters in all cases as future developments cannot always be correctly forecast. Further, in some cases, canals were specifically constructed to facilitate the transport of minerals such as limestone, etc., from quarries and mines which have long been worked out and the predominantly agricultural nature of the locality has not furnished sufficient traffic to replace the former tonnages.

It would also be uneconomic to maintain at great expense some waterways where traffic can be adequately catered for by other and cheaper means. But abandonment of certain undertakings need not and does not prejudice the benefits of water transport in other circumstances where geographical factors are more favourable.

The Future of the North Eastern Division.

What does the future hold, then, for this old established industry?

The Executive policy is to concentrate attention on those canals which promise to yield the best results from improvement schemes.

An instance occurs readily to mind in the case of Newark on the River Trent where the Town Lock recently became due for overhaul. In order to accommodate larger craft and to enable bigger tonnage to pass to Nottingham, a new lock of increased dimensions has been constructed which not only accommodates the largest craft but also passes boats four at a time compared with one previously (see Fig. 3). Transit time is accordingly reduced, thus affording quicker turn-round of craft.

In the 1951 Report of the British Transport Commission it is recorded that the Docks and Inland Waterways Executive have in the course of the year completed a detailed survey of the future possibilities of the inland waterway system, and have concluded that the following waterways in the North Eastern Division which already carry substantial traffic offer scope for commercial development, viz.: the Aire and Calder, the Sheffield and South Yorkshire and the River Trent.

In addition, the following waterways under existing conditions should probably be retained as part of the inland transport system either by reason of the tonnage of commercial traffic originating upon them, or because they form part of a through route—the Calder and Hebble and the Trent and Mersey.

The first main pre-occupation of the Executive was, of necessity, to weld the various canal authorities into one comprehensive organisation. This was a major task presenting many complications inasmuch as the waterways had not been grouped into a smaller number of undertakings similar to the railways under the Act of 1921.

To weld together so many units into one organisation took considerable time and had necessarily to be a gradual process.

That the Executive's waterways are making an important contribution to the country's transport system will be readily appreciated from the fact that in 1952 the total tonnage passing was over 12 millions of which nearly 5¾ millions or 46 per cent. originated in the North Eastern Division.

Port Operating Practice

Differences in British and American Methods

In a paper read early last month before the Merseyside and District section of the Institute of Transport, Mr. Francis H. Cave, general manager of the Mersey Docks and Harbour Board, drew attention to a number of differences in port working methods at British and foreign ports.

Mr. Cave said that owing to her vast size, North America could not be compared with any country in Europe. Uniformity in practice was not to be expected in ports which might be over 3,000 miles apart, and which served entirely different types of country and industry. One generalisation might, however, be made. Normally the range of tide was sufficiently small on both the Atlantic and Pacific Coasts to obviate the necessity of building enclosed docks. It was usual to construct piers or wharves out into the bay, harbour or river, and ships approached them and worked at them during all states of the tide.

On the Continent of Europe, port design was more closely akin to the British practice, though there were, of course, many differences in detail.

The dredging and conservancy work for American ports was not the responsibility of the port authority, but was undertaken on a federal basis by the Army Engineering Service in the United States, and by the National Harbours Board in Canada. State responsibility for that work was also common on the Continent of Europe.

On the Atlantic coast of America the majority of the dock systems were fairly old, as they were in this country, but some very fine port installations had recently been built. The normal method of construction on that coast had been to throw out comparatively short piers, most of them not being more than 600-ft. to 700-ft. in length. The piers, which generally had a narrow quay margin, were usually spanned by a single shed of one storey, but occasionally double-storied at the major berths. As they could accommodate a ship on either side, they were inclined to be narrow, according to British standards—not more than 250-ft. overall even in modern ones, whilst the older ones were often not more than 150-ft. wide.

Rail Connections.

In general terms, rail connections to the piers and wharves were not so well developed in North America as in Europe, though in some ports, such as Baltimore, where all the principal docks were owned by railway companies, it was nearly universal. It was of interest to note that New York itself—that was to say Manhattan Island—had no direct rail connections to its principal berths.

Where railway connections were provided a common method was to place two or three tracks down the centre of the pier. Those were brought in to the shed at a lower level than the floor of the shed, so that the floor of the wagons would be at shed level. They were known as "depressed" tracks, and that system was especially desirable, as all railway wagons were of the van-type — open wagons, except specials, being practically unknown. An added advantage arose from the great length of the wagons (50-ft. and more), which necessitated trucking in the wagon and on to the quay.

On the Pacific coast, where the ports were generally of newer construction than on the Atlantic coast, the position was rather different, and in many respects followed more closely to British practice, and the most modern designs provide for wide quay margins with railway lines, large and wide transit sheds, with additional railway lines set into fine roadways on the land side of the transit sheds.

Describing the construction of quays, Mr. Cave mentioned an interesting berth which he had inspected at New Orleans. In that case the wharf and shed had been built on a higher level from the river than was normally the case, with the result that the rail of a ship which he saw on its third day of loading was not more than 3-ft. above the quay level. In consequence, the derricks could swing the slings inboard with hardly any lifting. The stevedore informed him that that increased his speed of loading by three or four slings per hour per hatch.

Loading and Discharging Methods.

There was one feature of equipment in which the whole of North America differed profoundly from European practice. They did not consider it to be the duty of the port authority to provide discharging or loading cranes on the quayside. They argued with a certain amount of justification that the purpose of ships' derricks was to load or discharge the ship, and that they should do the job for which they were provided.

At the most a longitudinal girder was provided fixed to, but well above, the front of the shed. To that girder a pulley block could be attached opposite each hatch with a fall (known as a "housefall") operated by a winch in the shed working in conjunction with the fall of the ship's derricks. In effect, the cargo was raised vertically from the hold to above deck level by the ship's derrick and then drawn away to the front of the shed by the house fall, the ship's fall being slackened off to enable that horizontal movement to be performed. That system, which was also known as the cargo hoist system, was extremely effective in operation.

In the course of a long discussion which he had with the president of one of the leading stevedoring companies, with branches at all the principal Atlantic and Gulf coast ports, he maintained that the cargo hoist system by providing direct movement of cargo in a straight line from the hatch to the shed was more efficient than a quayside slewing crane.

"I must admit to being very strongly impressed, and find it difficult to understand why such a system, which has been in operation successfully in America for very many years, has never before been tried out in this country. It may be of interest that we in Liverpool have recently equipped a berth with a modification of the system," said Mr. Cave.

Transit Sheds.

Continuing, the speaker said the next most notable divergence between British and American practice lay in the dislike of the Americans to double-storey transit sheds. In the majority of the big ports one or two of those sheds could be found, but extremely poor use was generally made of the upper floors. It seemed strange to him that a nature so ingenious as the Americans had failed to provide really suitable equipment for the transfer of cargo between the upper floor and ground level.

In the circumstances he was not surprised at the dislike which they had for double-storey sheds, since in many berths one found nothing more than a cargo lift in each section, sometimes supplemented by a cargo chute. Stevedores naturally objected to working cargo with such poor facilities.

There was now a tendency, he noticed, to instal a lift which would take a lorry, or, if there was room, to build an inclined roadway to enable lorries to drive directly on to the upper ffoor. But these were very expensive expedients, and added considerably to the cost of shed construction; nor did they provide the flexibility of operation which could be obtained by the use of cranes, gravity jiggers and power hoists.

Palletisation.

Referring to mobile mechanical equipment normally used in America, Mr. Cave said the fork-lift truck had for several years been in universal use, generally in connection with the palletisation of cargo. He had an idea that they sometimes overdid palletisation and wasted time and labour through stowing unsuitable mixed cargoes on pallets for top piling in the sheds. But when they were handling a good run of convenient homogeneous cargo they made a magnificent job of it.

Great efforts had been made to sell the idea of cargo being stowed on pallets at the factory and then being untouched by hand until it was stowed in the ship, but he gathered that the response had been limited. One some of the Great Lakes ships, cargo on pallets was run into the ships' holds through the side ports by fork-lift trucks, and even stowed there still on the pallets, but that was a very specialised operation.

The normal method of moving palletised cargo between the stowage ground and the ship was by means of a small petrol tractor drawing three or four bogies each holding one pallet. As a matter of fact, that method of moving goods was very popular even when cargo was not palletised; and it had been most efficiently developed.

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Piecework and the Port Industry

Important Factor in Rapid Cargo Handling

By E. S. TOOTH

There is no doubt that the piecework system is an extremely important factor in the British port industry. It is a primary incentive to high outputs and, in these days of full employment and decasualisation, it has rivalled supervision as a means of securing speedy working. This does not mean that it has ousted supervision, about which more will be said later.

The piecework system has a simple basis—payment according to work done. The more tons or the bigger the quantity of packages handled within a specified period, the higher the payment to the gang concerned; and let it be said at once that this method of payment does produce high outputs.

Before considering the full implications of applying the system to port operating work, however, it will be useful to examine how piecework rates are framed. When a new job is undertaken in a piecework port, the first thing decided upon is its manning. This is controlled by (a) the type and pack of the commodity to be handled, (b) the particular work to be done, (c) the equipment (mechanical or otherwise) to be employed, and (d) the " geography " of the premises. As an example, (a) bags of almonds are (b) landed from barge, conveyed through transit shed and housed, through a " loophole," on the upper floor of a warehouse, using (c) a quay crane, electric platform trucks and a warehouse wall crane. Factors in (d), the " geography," include the route and distance to be travelled, the size of the shed doorways and the warehouse loophole and the type of surfaces to be traversed.

After considering these factors, the experienced supervisor knows what is a balanced gang for the job. There may sometimes be a bottleneck in the operation—in the example given, it may well be the slowness of intake through the warehouse loophole. If so, the manning for the rest of the job will be adjusted accordingly. Whatever the working conditions, however, it will be possible to estimate with some accuracy what tonnage or quantity of goods a properly constituted gang will be able to handle per hour; and custom and practice will determine what are fair earnings for reasonable work of the type under consideration. Knowing all this, arriving at an equitable piecework rate is a matter of calculation.

In our example, for instance, the job may need 18 men and the reasonable output for such a gang may be 120 tons per 8-hour day. For argument's sake, let it be assumed that the negotiating employer and trade union official agree that a fair day's pay for a man who makes a normal effort on this type of work is 32s. Then the piecework rate for this job is easily calculated. It is 18 x 32s., i.e. 576s. (the gang's total earnings for a reasonable effort) divided by the gang's output, i.e. 120 tons, which gives a piecework rate of 4s. 9d. per ton. If, after an agreed trial period, this rate proves to be an equitable one, it is added to the schedule of "permanent" rates. If, subsequently, a gang works poorly and only handles say 100 tons, its total earnings for the day will be 475s. and each man's share only about 26s. 6d.; if it achieves by extra effort an output of 150 tons per day, each man will get just under £2.

Overmanning will, of course, increase the cost of the job; undermanning will decrease its speed. An over estimate of the potential output will make the rate unsatisfactory to the gang, an under estimate will make it uneconomic to the employer.

There are too many instances of pressure to negotiate piecework rates the " easy " way—for instance, by comparing the job with another done elsewhere and presumed to be done under similar conditions; or by taking an existing job which has some resemblance to the new job and making a pro-rata adjustment to the rate on the basis of the comparative manning (which ignores the " output " factor); or by basing the rate on so much per man per ton—4d., for example (which in the example quoted would produce a piecework rate of 6s. per ton—or 1s. 3d. too much).

A " bad " rate is one which is too high to be economical or too low to be an incentive. An extremely high rate may also fail to be an incentive, sometimes because the gang need not work hard to earn good money but more often because they fear "an attack" on the rate if they reveal its true yield and thus prove it too high. From the employers'—and indeed from the country's—point of view, rates which yield earnings well above the " reasonable " are bad, for then it is inevitable that, over a period of time, existing " reasonable " rates will be deemed unsatisfactory and will become bones of contention. It is not in human nature for men to work hard in one shed, for less money than those in the next shed can get for three-quarters of the effort. There is a strong element of psychology in piecework.

" Good " rates and " bad " rates, from whichever point of view they are regarded—workpeople's or employers'—are all in reality bad rates.

In the field of piecework, the port industry has a unique position. In a factory, working conditions are usually stable and the same kind of goods are handled in the same way, day in and day out. In ports, however, the reverse obtains. Gangs work on ships and quays and in sheds and warehouses, all of widely varying types and construction, and handle a huge variety of commodities with a wide range of mechanical equipment. Moreover, the same men may be doing many of these different jobs in the same week—ship discharge and loading, shedding and warehousing imports, " striking " exports, weighing, piling, delivering, restowing. Each different operation on each different commodity has its own manning and piecework rate. The piecework schedule for a single group of busy docks can be a veritable book.

Need for Consistent Rate Standards.

There are three main points which it is desired to make in this article. The first is that negotiators must be just and consistent and must set standards and adhere to them. The extra trouble taken in negotiating rates the proper way, i.e. by basing them on accurate assessments of the fundamental factors, will pay handsome dividends. A schedule containing "inconsistent" rates can only lead to serious trouble.

In any port, three essentials are speedy working, care of cargo and safety of personnel. Speed is required in port operating

Port Operating Practice

(continued from previous page)

In consequence, the mechanical bogie—either petrol or electric—which was so widely used in the United Kingdom was hardly ever seen in America. He had suggested to one or two stevedores that the British system was very efficient, but their reaction was that a separate power unit and driver to each bogie seemed unduly expensive, both in capital and labour costs.

Mobile Cranes.

The number of mobile quay cranes to be seen in America was nothing like so great as in this country, no doubt because of the extensive use of fork-lift trucks. He noticed, however, that mobile cranes over there really made use of their mobility as well as their lifting capacity. It was a common practice for a crane which picked up a sling at the ship's side to run with the sling to the stowage ground rather than transfer it to a mechanical truck or trailer.

Floating cranes were provided at all American ports, although they did not seem to be quite so common as in Britain. It seemed to be usual to mount them on dumb barges and very few were self-propelled.

In conclusion, the speaker said a great deal of thought was being given in America to the problem of mechanising the inboard work of stowing and unstowing cargo and he believed a National Commission was appointed to examine the question. He added that extensive use was made of small sections of roller conveyor for moving packages in the ship. That system was used to a certain extent in England, but there seemed to be an unwarranted prejudice against it.

After his first visit to America, he bought on behalf of his board a considerable quantity of roller conveyor for free loan to stevedores, but the men declined to co-operate in its use. Every American stevedore whom he had met agreed that the work was speeded up, damage to cargo was minimised, and the strength of the men was husbanded by the maximum use of these handy appliances.

Piecework and the Port Industry—continued

work, of course, in the interests of economy. Speedy working not only reduces handling costs, it effects savings in the time it takes to turn round ships, barges and vehicles and this also makes it possible to deal with a greater number of vessels at the same berth over a given period. There can be no doubt how piecework affects working speeds and it is no exaggeration to say that in many jobs, especially those connected with ship discharge and loading, the incentive of piecework can often double output. Some interests, however, are opposed to piecework because, they assert, (1) it makes for a careless attitude towards cargo, equipment and property and (2) in the interests of high earnings, gangs will often adopt dangerous methods of working.

There is certainly evidence of such tendencies. Common examples include dragging out frail packages by crane or winch power from 'tween deck wing stowages, instead of making them into sets in the square of the hatch under plumb of the purchase; overloading mechanical appliances, such as cranes and fork-lift trucks; and dropping, instead of placing, packages (of fruit, for instance) into stowage.

It is fair to say, however, that when any such things as these occur, the whole reason may not be the desire for speed; part of it may be the wish to do work in the least arduous way, irrespective of the consequences to the goods, the machine, the equipment or even the ship or premises. Nevertheless, whether such practices can be attributed to the piecework system, to "easy" methods of working or to both, there is only one remedy possible. It is adequate and practical supervision.

The second fundamental point it is desired to make therefore, is that in the port industry the piecework system cannot be operated successfully without high-quality supervision. There are so many things to be taken care of besides speed. It should be remembered that, although the shipowner and his labour contractor particularly want speed, owners of goods are more concerned with having their consignments delivered to them in good condition. Hence labour supervisors have the important and difficult task of holding a balance between speed and careful working and because of this fact it should be emphasised that supervision must be practical.

Among shipping interests there is a frequently held belief that, once they have been started, piecework gangs will get on with their jobs satisfactorily without supervision. This idea originates from the belief that speed is the one and only need in port work. As stated, it is not; but although cargoes, ships, machines and premises must not be damaged in the service of speed, it is just as important that the pendulum does not swing the other way. Merchants and others may press for slower work or special caution which the experienced supervisor knows is not necessary in the particular circumstances. In such cases he must use his own discretion.

Efficient Planning Essential.

Planning is another essential part of the supervisor's duties. Left without specific instructions, ship's gangs, for instance, would often select the speediest working cargo to discharge first, because it offers high earnings. Such action could make the next job much harder and slower than it would otherwise have been. Quay gangs, if allowed to follow their own desires, might, for expediency, use the nearest and clearest part of a transit shed although such action would materially delay other work later on. Careful planning is necessary to see that priority of consideration is given to those individual jobs which control the speed of the operation as a whole. It is of little use speeding up the discharge of one hold of a vessel at the expense of the next, if the latter is the controlling hold. This matter is of no interest to the piecework gang but it is of vital concern to the supervisor.

Often, because the supervisor has to take this bird's-eye view, he has to get certain gangs to work in such a way as to lessen the output they would have obtained had they been able to work the simplest way and to take the shortest cuts. Under "daywork" conditions—i.e. work without piecework or bonus incentives—this would not be important to the gang; it would be accepted as necessary.

Under piecework conditions, however, there is the opportunity in such circumstances for the "awkward" man to cause trouble. Comparatively rare though he may be, he can be a disrupting influence, for he can (and does) keep re-iterating and exaggerating how much the men in his gang are losing because they have not got ideal conditions. The fact is, of course, that piecework rates are made for "general" conditions and it is an understood thing that, within reason, both the employers and the workpeople "take the rough with the smooth." This phrase is, in fact, a current one in piecework discussions and, in port operating work, the system would not work if the principle it embodies were not acceptable to both parties. Another point upon which the "awkward" man will fasten is that the lines of demarcation between the various jobs are often very fine. Unless the employer has the goodwill of the workpeople, this fact is often a potential cause of dispute. Hence the obvious need for close co-operation and mutual understanding with the Union and particularly for accurate definition when piecework rates are negotiated. There must be no doubt about what description of commodity a rate applies to, how many men it covers and what particular work it includes.

Prior to the war, the "awkward" man—who found so many rates "wrong"—soon became known to the employers and the trades union and was not readily given employment. In these days of full employment and decasualisation, however, happy though they may be from many points of view, the "awkward" man keeps popping up everywhere. Since no employer will offer him anything approaching permanency, he must frequently be directed to work by the Sector Manager of the National Dock Labour Board and he travels round the port, always being liable to initiate disputes wherever he goes.

This state of affairs does anything but lighten the task of supervision and there is no doubt that the only satisfactory way to deal with the position is to plan ahead as far and as carefully as possible. Working difficulties—especially those concerned with labour—are more troublesome to deal with if they occur without notice than if they are appreciated the day before. Nothing causes more discontent than the awkward job muddled through, for the men are losing earnings. Difficulties should, therefore, be anticipated and active steps be taken to solve them or at least to minimise them before they arise; future work should be studied to make sure there are adequate piecework rates to cover it. Few of the difficulties in port operating work, whether concerned with piecework or not, are utterly unavoidable.

Mechanical equipment is often introduced in the interests of speed and a word should be said here upon how goods-handling machines fit into piecework conditions. As is well known, one of the difficulties connected with introducing appliances into dock operating work is the fear of the workpeople that mechanisation will cause redundancy. It should be mentioned in parenthesis, therefore, that it is extremely doubtful whether mechanisation could ever be introduced into port work at such a rate that any appreciable effect on employment would be noticeable. For one thing, its initial costs are too high; for another, it takes time to get machines delivered and (where necessary) premises altered so that the machines can work satisfactory.

However, when a hitherto manual job is to be mechanised, often the greatest difficulty which still arises is to get the workpeople's representative to agree to the necessary adjustment in manning. As has been stated, correct manning is one of the fundamental factors for framing satisfactory piecework rates and if too many men are insisted upon, an economic rate cannot be negotiated. Just as important is the fact that, if, to meet the Union's demands, a compromise manning scale is agreed to—that is, something between the old and the new requirements—there will be men in the new gang with no job to do. The implications of this are obviously important and far reaching.

Need for Full Co-operation.

It must always be borne in mind that the primary reason for operating the piecework system in dock work is, by inducing greater speed, to effect the economies mentioned—viz., cheaper goods handling, quicker turn round of vessels and vehicles and, indirectly,

Piecework and the Port Industry—continued

a fuller use of port facilities, all of which eventually benefit the community.

If these economies are to be effected, the employer of labour, whether port authority, master stevedore or master porter, cannot effect them entirely by his own efforts.

Lighterage, cartage and railway contractors, cargo superintendents and H.M. Customs are also concerned with co-operating in the operation of the piecework system, the contractors because they thereby get their craft and vehicles loaded or emptied more quickly, the cargo superintendents because they are agents for the shipping company. One important step which each of these interests must take is to ensure that there are no tallying bottlenecks.

The third point it is desired to make, therefore, is that the operation of the piecework system is not solely the concern of the employer of labour, who orders, organises and pays the gangs. It touches all the interests intimately connected with port work. From all of them some degree of co-operation is required if the scheme is to be fully successful.

In this connection it should be mentioned that the shipowner must, in a piecework port, take a long term rather than a short term view on one particular matter. The running costs of a vessel are often hundreds of pounds a day; the missing of a tide can, therefore, be expensive. There is thus sometimes the temptation for the shipowner to offer exhorbitant payments to gangs to finish the ship by a certain time. An isolated instance of this kind would have little significance but, once this becomes practice, it also becomes a bargaining matter and it is beyond human nature to expect such bargaining always to be on a fair basis. Extremely high payments, even for work rushed, often mean throwing over fair piecework rates and raise expectations of exhorbitant yields from rates applicable under normal conditions. These yields, of course, do not materialise and the stevedoring agent is presented with a ready-made cause of discontent which should never have existed.

The wise trades union official is keenly aware of this and since, like the employers' representative, he knows that the record payment of today is the standard of tomorrow, he always tries to keep negotiations on a sound basis. Guiding him, too, is the pledge given by the British Trades Union movement to do all in its power to reduce commodity prices—in which, of course, handling costs are an important element.

To sum up, the piecework system will undoubtedly be a feature of the British Port Industry for a very long time to come. It has its disadvantages—in some quarters it is even argued that it is a social evil—but there is no doubt that it offers the best incentive to speedy work yet discovered—viz. higher wages. Although the basic factors of piecework rates can be stated and understood simply, the human element plays such a large part, not only in assessing the possibilities of a job but also in actually doing it, that, without wide experience and also tenacity of purpose, negotiators can very easily arrive at agreements other than just and consistent.

The piecework system does not, as is believed in some quarters, reduce the need for supervision—it only changes its emphasis. A main difference is that in " daywork " jobs, supervision is necessary to ensure that there is reasonable speed; in "piecework" jobs, it is necessary to ensure that the desire for speed does not lead to unwanted complications—e.g. damage, injury and delay.

Finally, piecework is not only the business of the labour employer. In the port industry, its implications and effects are so important and so far reaching, that it is the concern of the country. Without piecework in our major ports, speeds of working would undoubtedly be much reduced. One important point must, however, always be closely watched. Negotiators must strive to agree " consistent " rates—i.e. rates which all give approximately the same yield for the same effort. In the realm of piecework, comparisons must not be odious.

The Development of Turkish Ports

Extensive Programme of Major Improvements

By REG BUTLER

Few countries in post-war years have experienced a more rapid expansion of import and export trade than Turkey. This expansion is largely the effect of a major development programme that aims to exploit more fully Turkey's extremely rich, but underdeveloped, agricultural, mining and industrial resources.

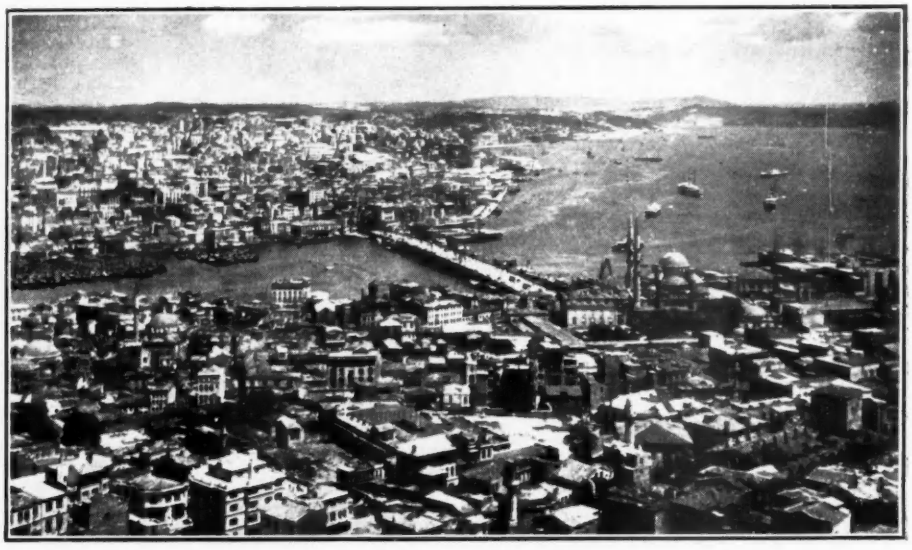
Mechanisation of farming methods, encouragement of foreign investment and application of modern techniques are all helping to give Turkey a fast-expanding economy. In the agricultural sector alone, cotton production has risen from 104,000 tons in 1949 to 165,000 tons in 1952. Cereal production has likewise climbed from 8.9 million tons to 13.6 million tons in 1953. For both cotton and cereals, Turkey is now taking her place as one of the world's major suppliers.

Even before the expansion of the last few years, Turkey's communication network and port facilities were grossly inadequate. As a typical example: in 1945 and 1946 it took 18 months to move 400,000 tons of Turkish grain from farms to ports. Then, owing to insufficient loading and storage facilities at the ports, crop movement was still further delayed, at a time when famine in neighbouring Greece made speed urgent.

The bottleneck at the ports, obviously made more acute by Turkey's current trade expansion, has proved a considerable handicap in recent years. That is the background to the present programme of developing and improving port facilities. On November 27th, 1953, the Turkish Parliament passed a law authorising the Government to spend £24,000,000 on harbour developments. That is in addition to smaller sums voted in previous years.

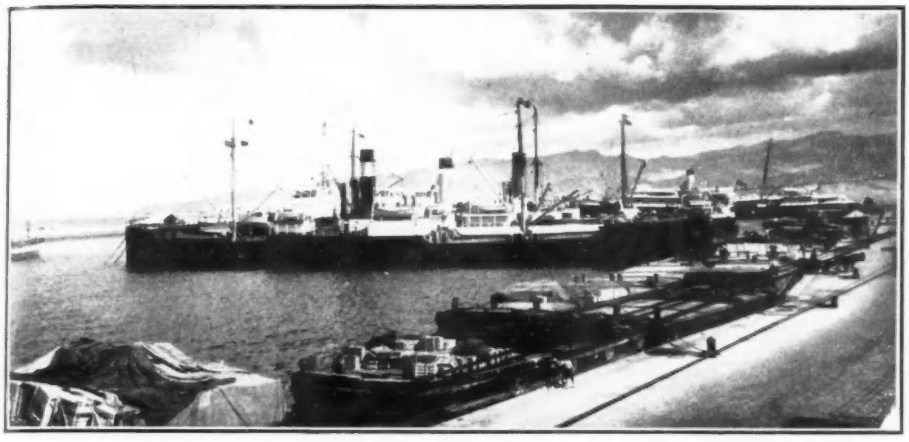
The Port of Istanbul

Turkey's chief port is Istanbul, situated upon one of the world's finest natural harbours. The inner harbour, along the shores of the Golden Horn, is hampered by a poorly-arranged commercial waterfront. The years between the end of the first world war and the beginning of the second saw a continual drop in the tonnage handled : from 14,519,000 metric tons in 1920 to 6,554,000 metric tons in 1940 — figures that also in-



The port of Istanbul, showing the Golden Horn (from left centre) and the Bosphorous.

Development of Turkish Ports—continued



The waterfront at Izmir, closely hemmed in by one of the city's main thoroughfares.

clude small amounts of traffic passing through other ports on the Sea of Marmara.

Understandably, with such a steady decline, the harbour authorities had no incentive to modernise Istanbul's facilities. Freight handling remained antiquated and demurrage charges were high. Soap and leather factories, and warehouses for coastal trade, replaced some of the shipways and service quays, which could be better used for international traffic.

Now, however, that there is every likelihood of Istanbul regaining her previous importance, harbour improvements are at last taking shape. A long-debated project to build a bridge across the narrow Bosphorous, and thus link Europe with Asia, has finally resulted in the allocation of the building contract to the German firm of Krupp.

When completed, the bridge will certainly result in more cargo traffic passing through Istanbul. At the same time, it will help relieve congestion in the port from the large numbers of ferry steamers that daily ply to and fro across the busiest part of the harbour, between the Asiatic and European sides of Istanbul, across the neck of the Bosphorous, where it joins the Sea of Marmara. Meanwhile, thanks to the new Port Development Law, modernisation and re-equipment of the harbour is planned to begin during 1954.

The Port of Izmir

Izmir, Turkey's second port, suffers from fewer drawbacks. Like Istanbul, it is one of the world's finest natural harbours. In 1922, when the defeated Greek army withdrew through Izmir (then called Smyrna), fire broke out and devastated the town. Since then, Izmir has been largely reconstructed as a model city — and, indeed, a most beautiful one. The chief disadvantage however, is that one of the city's main thoroughfares skirts the waterfront thus cramping the rail and warehouse facilities.

The largest proportion of Turkey's agricultural export traffic is routed through Izmir, which is the trading centre of the richest tobacco, cotton and fruit areas. Fortunately, there is ample room further along the shores of the harbour for the present programme of expansion and modernisation—though, as yet, the problem is not quite so urgent as in other Turkish ports.

The Black Sea Ports

Samsun.—The biggest of the construction projects is at Samsun, on the Black Sea. Contracts for the building of port facilities, involving the expenditure of £8,500,000, were awarded in August 1953. The project includes a breakwater, three miles in length, as well as an 800-yard quay.

The economic importance of this port construction is considerable. Famed as the centre for the highest quality Turkish tobacco, Samsun has remained undeveloped for general trade. However, it is the principal natural outlet for the trading region along the Black Sea coast which, with the exception of the small town of Sinop, lacks natural harbours.

When the present construction work is completed, the port will be able to handle 800,000 tons of merchandise annually, of which half is expected to be grain and about 12½ per cent. coal.

Zonguldak.—Another Black Sea port where expansion has been made imperative by the economic boom in the interior, is Zonguldak, which is principally engaged in shipping coal. A harbour improvement project costing £3,185,000 is nearing completion, together with a £2,450,000 programme for the purchase and installation of coal and ore handling equipment in the docks. Thanks to increasd coal production, Turkey has now become an exporter—indeed, the only coal-exporting country in the southern Mediterranean. The export from Zonguldak has now reached 100,000 tons of coal annually, and is expected to increase rapidly.

Eregli.—At the western end of that same coal district is Eregli, where considerable improvements have been made in recent years — principally the construction of a breakwater. Similar work is also continuing at **Trabzon** and **Inebolu.** The importance of all these Black Sea ports grew steadily between 1920 and 1940, with cargo tonnage expanding from 7,365,000 tons to 9,555,000. In proportion, they will probably benefit more from current economic expansion than the Aegean or Mediterranean ports.

Mersin and Iskenderun are the only other Mediterranean ports of any magnitude. The former, a surf port, is the principal outlet for Turkey's expanding production of chrome, copper and other ores. A bill to enable building work to start on Mersin harbour has recently been presented to the Turkish Parliament.

The importance of Iskenderun — formerly called Alexandretta—is mainly strategic. Situated at the extreme eastern end of Turkey's Mediterranean coastline, close to the Syrian border, Iskenderun has been developed recently as a naval base—the second largest Turkish naval base after Gölcük in the Marmara region. The United States, with Turkish participation, has built a self-contained repair base there, together with other facilities, including military roads linking Iskenderun with the interior. The installations are designed to give Turkey and her NATO partners advanced repair and supply facilities in an area where none existed previously. The new naval installations were formally handed over to Turkey on October 20th, 1953.

In addition to its strategic value, Iskenderun also serves the thriving farming region of the Cicilian plains between the Taurus mountains and the Mediterranean coast—another major cotton exporting area. Port improvements and construction of new facilities are included in the Government's recent Port Development Law. Work will start during 1954.

In the past, some of Turkey's development projects have been criticised for over-ambition and lack of reality in the prevailing economic circumstances. But the Port Development Programme is soundly based on the economic facts of Turkey's entry into world markets. According to official figures, the volume of Turkish exports has more than doubled between 1949 and 1953. The Turkish aim is to ensure that her growing prosperity is not hamstrung by out-of-date facilities at the ports.

Swansea Docks Survey

It was recently announced that the British Transport Commission is to undertake a special examination of the facilities of Swansea's docks with a view to carrying out the large-scale improvements for which the Swansea Corporation and the local Chamber of Commerce have been pressing. The chief docks manager of the Commission will conduct the investigation, and will later discuss the position with the Chamber of Commerce. The improvements and maintenance work are likely to involve a substantial amount running into many thousands of pounds. One of the big items the Commission has been asked to consider is an additional lock entrance. A great deal of technical work on the sills is also considered necessary.

United States Customs Service

Its Role in the Shipping Picture*

No story of a port's shipping can hope to be complete without a glimpse at the role played by the United States Customs Service, of which so little is generally known or understood. From the time a vessel plying the high seas enters within the port limits or leaves its portals, the steamship operators must deal with the Customs Service. Similarly, from the moment a merchant contemplates entering the field of foreign trade, he must take into account his relations with the Tariff Act and the comparatively small handful of men and women who administer its provisions and those related federal laws and regulations.

Functions and Obligations.

The functions of the Customs Service fall naturally into three general categories—as they relate to the vessels themselves, to imports and to exports.

Every foreign flag vessel is required to enter and clear at the customhouse upon arrival at and departure from a United States port. In addition, American vessels must enter and clear when engaged in trade between the United States and foreign ports and must also clear before departing for a domestic port located in non-contiguous territory. (Non-contiguous territories are those possessions of the United States which are not adjacent to the mainland, i.e. Alaska, Hawaii and Puerto Rico.)

The Master of a vessel accomplishes entrance by filing manifests of the ship's cargo, together with her lists of passengers, stores and crew's possessions. A clearance from the last port of call must be produced, as well as evidence that the ship has passed quarantine inspection by the United States Public Health Service. The ship's register is deposited at the customhouse where it remains until clearance is granted. Bond is given by the Master or agent of the vessel to secure payment of all fees, taxes or penalties which may accrue in connection with the activities of the ship while in port.

Before the vessel's departure, the Master applies for clearance by submitting manifests of all cargo laden in the port with export declarations covering each item listed, together with lists of passengers embarked and a list of outgoing crew members. Clearance is issued by Customs after it has been determined that all requirements of Customs, Immigration, Coast Guard, Public Health and Bureau of Foreign Commerce have been met.

Customs revenue is collected in the form of entrance and clearance fees and tonnage taxes, based upon the vessel's registered net tonnage.

Customhouse Records.

Every vessel owned and operated commercially in the United States must be documented by the Customs Service if it is of five net tons or more. These documents contain the names and addresses of the owners, detailed descriptions of the vessels, their dimensions, gross and net tonnages, their names, rigs and types of service. In order that ownership as expressed in the documents may be exact, title records are kept in the customhouse. Each purchaser of a documented vessel must record his bill of sale at the customhouse before a vessel document will be issued. Upon transfer of title, the old document is surrendered by the seller and a new one issued to the buyer. Mortgages and similar instruments affecting title are also recorded in the customhouse. Here, too, abstracts of title may be examined by prospective purchasers.

Much of the data which appears on the vessel document is supplied by the customs admeasurer, who computes gross and net tonnages by actual physical measurement. Gross tonnage, roughly speaking, is the volume of enclosed space expressed in terms of tons of one hundred cubic feet. Net tonnage is the gross tonnage minus spaces used for engine room, crew's quarters, storage bunker fuel, navigating rooms, etc. The net tonnage expresses, in some degree, the space available for the carriage of cargo and is the figure upon which tonnages taxes are based.

*An article by an Officer of Customs, reprinted by kind permission from the Los Angeles Shipping Directory, January, 1954.

Customs Routine.

The arrival of a vessel from a foreign country is the signal which sets off a veritable beehive of activity by customs personnel. A searching squad may go aboard, seeking narcotics or other contraband. On one hand, a group of inspectors is busily engaged questioning crew and passengers, examining their baggage and foreign purchases, delving all the while into the many perplexing problems of exemptions and travel allowances. At times, they even act as immigration inspectors. Farther on, another group of inspectors is supervising the discharge of commercial cargo, tending to its segregation, weight, measure, gauge and count.

Following these operations, the various cargo lots must be disposed of in accordance with Customs Service instructions and practices. Some portions may be directed toward the Appraiser's Stores for examination. Some may be transferred in bond, either to warehouse or for transshipment to other destination points in the country. The balance may be delivered to customs licensed truckmen for delivery to the importers' premises.

Import Procedures.

The one most directly concerned with these customs activities is the importer. By this time, of course, he has already decided that his importation was worthwhile. But suppose we retrogress for a moment to the point where he had merely contemplated a particular importation. The uninitiated importer, by the way, would be well advised to obtain complete details, not only as to shipping charges, freight costs and marketability, but as to tariff status as well—whether free or dutiable, and, if dutiable, the amount of the duty. The latter may be a deciding factor in the venture. Dutiable merchandise, he will learn, is subject to three types of duty—specific (based on weight, gauge, count or measure), ad valorem (based on vslue), or a combination of both.

Let us take a simple illustration and follow the course of an individual lot of merchandise from its supply centre abroad to the market place in this country. Let us consider, for example, a lot of dinnerware which a local merchant contemplates importing from Japan. He knows the basic cost of a set of the dinnerware in which he is interested. He knows the cost of packaging, insurance, freight, shipping and cartage. But how much will Import Duties add to his unit cost?

At the customhouse, he is told of the various elements which affect the classification of his merchandise and the determination of the rates of duty. Is the article earthenware or chinaware? Is it decorated or not? If chinaware, is it bone china or not? He learns that there is a fully equipped customs laboratory to which technical or scientific problems as to various commodities are referred for analysis and advice. (In this instance it is pottery. At other times, the laboratory will be called upon to consider a host of other items, such as metals, liquors, soaps, foodstuffs, etc.)

The prospective importer learns that the rate of duty may vary, depending upon such other factors as size, use, composition, or value per dozen pieces. He hears a phrase "appraisal value"—which is not always the same as the invoiced value—but which, nevertheless, governs the rate and basis for the assessment of the customs duties. Many complex factors must be taken into account by the Appraiser in arriving at this "appraised value." There are questions as to the dutiability of taxes, discounts, commissions paid or received. Often, the consideration of these and other factors varies with the commodity and type of purchase. The importer had best consult the Appraiser or one of his staff of examiners who specialises in different lines of merchandise, i.e. foodstuffs, metals, textiles, etc.

With this information now in his possession—plus the advice to retain a customs broker who will save him much valuable time and effort and who is licensed by the Treasury Department to represent him in customs matters—the merchant is now in a position to determine whether or not it is profitable to import the merchandise in question. Having decided in the affirmative, he orders ten sets, to be packed in ten cases, makes his credit and shipping arrangements and sits back to await further developments.

Upon the docking of the vessel, the importer or his broker prepares the customs entry papers, presents them with his invoice, surety bond and bill of lading or carrier's certificate at the customhouse and pays the estimated duties. The customs entry officer

United States Customs Service—continued

checks the documents, notes thereon a case number, selected at random, for examination at the Appraiser's Stores and returns the customs permit for use in obtaining delivery of the other nine cases at the pier. The entry officer, incidentally, is guided in his determination of the place of examination by the type of merchandise on the entry. Steel and lumber, for example, are examined at the dock. Cased merchandise, such as liquor or the dinnerware here involved, is examined at the Appraiser's Stores. Exceptionally heavy merchandise, like sheet glass and heavy machines, though cased, may be examined at the importer's premises.

The customs inspector, meanwhile, supervises the unlading and tally of the ship's cargo, checks the manifest and notes thereon the entries applicable to each lot. He obtains his weights, etc., and then disposes of the merchandise in accordance with the entry officer's instructions on the permit. The case selected for examination at the Appraiser's Stores is transferred there by a bonded cartman, is opened and its contents examined, analysed, appraised and repacked for delivery to the importer. As the merchandise is representative of the unexamined portion of the importation, the examiner records his description for the entire invoice. The custom liquidator reviews the various documents and reports and ascertains the rates and amounts of duty actually due—if it is the same as estimated and paid at the time of entry, no adjustment is necessary; if at variance, increased duties are assessed or excess deposits refunded.

This importation has had relatively smooth sailing through customs. Such is not always the case. Diverse questions often arise and must be settled. Legal marking of the country of origin presents many problems. Owners of copyrights, trademarks and patents receive protection in the administration of the customs laws. Some commodities, such as sugar, wheat, cotton, etc., are subject to import quota restrictions. Licensing requirements and compliance with the laws and regulations of other federal agencies, such as the Federal Security Agency, the Departments of Agriculture, Commerce and State, as they affect imports, are all supervised by the Customs Service.

Exports.

As to exports, there is no export duty but before any cargo may be so laden, the shipper must file an export declaration. This declaration contains a description of the merchandise, its quantity, value and foreign consignee's name and address. Many commodities require licences (issued by the Bureau of Foreign Commerce and/or State Department) before they may be shipped. Consequently, all declarations are carefully screened before they are validated.

After validation, a duplicate copy of the export declaration is returned to the shipper who takes it to the pier with the goods it covers. The Master subsequently surrenders these duplicates at the customhouse when he clears his vessel.

There are innumerable ramifications, specialised functions and activities of the Customs Service which are well nigh impossible to include in as brief an account as this perforce must be.

Oil Pollution of the Sea

International Conference Convened

In our issue of November last a summary was published of an unofficial international conference on Oil Pollution of the Sea, held in London at the end of the previous month. It will be remembered that, at that meeting, some constructive suggestions were made. Speakers from the several countries represented proposed that an organisation with the expert qualifications and continuity of the Inter-Governmental Maritime Consultative Organisation would be more suited than any other body to solve intergovernmental shipping problems. At the same time, concern was expressed at the delay in bringing I.M.C.O. into being.

The Minister of Transport announced at the conference that the British Government was recommending to the Economic and Social Council of the United Nations that an official International Conference be convened to draw up a convention on oil pollution. This was subsequently agreed, and the conference is to be held in London on the 26th of this month. A resumé of the events leading up to the decision is as follows:—

In a letter informing Secretary-General Dag Hammarskjold of this proposal, the U.K. Government said that any resulting convention would be brought within the scope of the proposed Inter-Governmental Maritime Consultative Organisation when it comes into being as a U.N. specialised agency. The U.K. also asked whether the United Nations would be prepared to make available the information on the issue which had previously been supplied to it by a number of governments, and added that the decision to call the conference had been made following the recommendations of a special committee appointed to consider the matter " in view of the increasing seriousness of the pollution of the coasts of the United Kingdom. . . ." It said that invitations to attend the meeting had been sent to countries which took part in the 1948 Safety of Life at Sea Conference, to additional countries which afterwards accepted the convention drawn up at this Conference, and to other countries with more than 100,000 gross tons of shipping. In all, these nations amount to 41.

In reply, Mr. Hammarskjold said that due note had been taken of the information " and in particular of the intention that any agreement resulting from the meeting should be brought within the scope of I.M.C.O. when it is set up and that a representative of the United Nations Secretariat would be invited to attend the meeting." He also expressed the willingness of the Secretariat to make the required information from governments available.

The United Kingdom's proposal and his reply in a report on the pollution question is now being considered by the Economic and Social Council at its forthcoming session, which opened at U.N. Headquarters on March 30 last.

It will be recalled that the question was first studied on an international level in 1926, when experts attended a Preliminary Conference on Oil Pollution of Navigable Waters held in Washington at the invitation of the United States. The text of a draft convention was adopted, but it was not subsequently ratified by governments.

Eight years later, in 1934, the United Kingdom brought the matter before the League of Nations, whose Council authorised preparatory studies with a view to the conclusion of an international convention. In addition, the Secretary-General of the League sent out a questionnaire to 69 governments, and the replies indicated that the countries concerned took a serious view of the issue and felt that the preparation of an international convention was justified.

Accordingly, the text of a new convention was drafted the following year by a committee of experts, and the majority of nations responded favourably to a proposal that an international conference should be convened. It never took place, however, first because of the withdrawal from the League of three major maritime countries—Japan, Germany and Italy—and then because of the war.

The United Nations first turned its attention to the sea pollution problem in 1950, when the Economic and Social Council asked governments whether they felt that preliminary action should be taken, pending the establishment of the Inter-Governmental Maritime Consultative Organisation. I.M.C.O. was created at the U.N. Maritime Conference, held in Geneva in March, 1948. It will start to function as a U.N. specialised agency when its convention has been ratified by 21 countries, of which seven must each possess at least one million tons of shipping. So far, 14 nations have ratified the convention, including the required seven.

The replies to E.C.O.S.O.C's questionnaire showed that while there was great interest in the examination of the problem, there was some difference of opinion as to its urgency, and as to whether or not a meeting of experts should be called before I.M.C.O. came into being.

After considering the replies, the Council decided in August, 1951, to invite the initiation of studies on the subject by interested governments which had not already taken such action, and which possessed the necessary technical facilities. The results of the studies were to be transmitted to I.M.C.O.

Oil Pollution of the Sea—continued

After a substantial number of studies had been received, the Council adopted its 1953 resolution authorising the Secretary-General to request interested countries to make experts in the field available to him in order that material on the subject might be correlated and prepared for future presentation to I.M.C.O. The Council added the proviso, however, that the Secretary-General was to take this action only if he found that at least three governments were prepared to provide experts.

In his report, Mr. Hammarskjold says that three nations—France, the Netherlands and the United Kingdom—agreed "in principle." He states, however, that when the U.K. informed him of its intention to call a conference, it also expressed the belief that, under the circumstances, there would be "no point" in proceeding with the establishment of the proposed body of experts, and added that it now wished to reserve its position concerning the provision of an expert.

The Secretary-General concluded with the observation that in the light of these new developments the Council "may wish to reconsider its previous decision concerning this matter."

It is, of course, well known that there are various causes of sea water pollution. Ships carrying oil either for cargo or for fuel are mainly responsible, but certain shore establishments, such as refineries, are sometimes offenders.

Damage is caused principally to the fishing industry, to sea birds and sea vegetation, and to beaches. In addition, there is a hazard to ports, through the possibility of floating oil catching fire.

Among the remedies which have been proposed during the approximately 30 years in which the problem has received governmental study are the establishment of zones where the discharge of oil and oily water would be prohibited, and the installation of oil separators in ports or on board ship.

Studies are being continued by the British Government particularly in respect of the establishment of oil discharge prohibition zones. In this connection some 2,000 plastic envelopes were recently dropped over a 2,000-mile stretch of the Atlantic Ocean, the purpose being to discover the speed and direction of the ocean currents which are believed to carry oil patches to the coasts of Britain, which are among those most severely affected.

Manufacturers' Announcements

Underwater Lubrication of Bearings

Particulars have been received of a device to lubricate bearings which normally suffer extreme wear and abrasion in water loaded with sandy particles.

French patents have been granted to M. A. Gentilhomme of Nantes for a system which injects oily air into submerged bearings.

Each side of, for example, the lower bearing of a bucket dredge is modified to provide an annular space into which the oiled air is blown. The presence of air is claimed to effectively seal the bearing against the intrusion of water and abrasives, while a continuous supply of lubrication is assured. The needs of the bearing are served by a small compressor working through a conventional lubricator.

Comparative figures, which refer only to the fuel consumption of two dredgers of similar capacity, working under the same conditions at Loire Maritime during August, 1953, show a fuel saving of 30 per cent. in respect of the dredger fitted with the Gentilhomme lubricator. The saving in wear and tear was not in this instance specified, though it may well have been considerable. The oil consumption of the device was five ounces per hour.

New Industrial Film

The progress made in manufacturing techniques and in the uses of tubular steel, which represents one of the most remarkable industrial developments of the post-war years, is the subject of a new film made by Stewarts and Lloyds, Limited, titled "The Tubewright." This film shows how the hollow structural member was adapted to steel structures in the design of the tubular Menai Strait and Forth Bridges by British engineers of the 19th century.

Despite these early successful examples, for many years little headway was made in the technique due to the difficulty of making economical and efficient tube-to-tube connections. It was not until modern arc welding was fully developed in comparatively recent times that new advances were possible and full advantage could be taken of the high strength to weight ratio of tubular steel construction. The film demonstrates the successful application of steel tubes as structural members in bridge building, crane jibs and materials handling equipment; emphasises their growing worth to the building industry; and records in some detail the recent construction of factories with all-welded tubular-steel frames.

One of the more recent examples is the new factory at Liverpool which Tubewrights, Ltd., a subsidiary of Stewarts and Lloyds, has built for its own occupation. A description of the new building appeared in last month's issue of this Journal. In this new factory, bridges, jibs, electric railway gantries, transmission and floodlighting towers, roof trusses, cable drums, materials handling equipment, gates and fencing are now being mass-produced for the home and world markets.

"The Tubewright," an Ace Film Production, is available for showing free of charge.

SITUATIONS VACANT

THE BRITISH TRANSPORT COMMISSION (DOCKS AND INLAND WATERWAYS), 22, Dorset Square, London, N.W.1, invite applications for a Sectional Head, Drawing Office, Civil Engineer's Department, Humber Ports, Hull. Starting salary £757 10s. 0d. per annum. Applicants should have good experience of design and estimating for bridges and general steel construction. Experience of lock gates an advantage. Applications should be sent to the Staff and Establishment Officer at the above address to arrive not later than the 26th April, 1954.

The Board of Trustees of the Port of Aden require the services of a Secretary (male) of British nationality. He should possess wide experience of Port and Harbour administration including, in particular, wharf and port rating, staff administration and general office routine. He should be capable of handling all routine Port and Harbour affairs and of preparing memoranda for submission to the Trustees as required. Some legal knowledge would be an advantage. Salary £1,500 per annum rising to £1,900, with annual increments of £50. The starting salary within the scale to be in accordance with qualifications and experience. Free passages out and home. Free unfurnished quarters. Basic furniture can be hired from Port Trust on reasonable terms. Free medical attention provided. But not hospital treatment. If admitted to the Board's permanent establishment the Secretary will be subject to Port Trust leave and passage regulations, also Contributory Pension Fund Rules.

Form of application obtainable from Consulting Engineers & Agents, Aden Port Trust, 1, Lygon Place, Grosvenor Gardens, London, S.W.1.

TYNE IMPROVEMENT COMMISSION.
APPOINTMENT OF ASSISTANT CIVIL ENGINEERS.

Applications are invited from qualified Civil Engineers. University Graduates in Engineering or Student Members of the Institution of Civil Engineers who have passed Parts I and II of the Associated Membership Examination for appointments as Assistant Civil Engineers.

Applicants should preferably have experience of engineering work associated with a Dock and Harbour Authority which includes the construction and/or maintenance of quays, coal and iron ore handling appliances, railways, transit sheds, building construction, surveying, sounding, dredging, moorings, water supply, drainage works, etc., and the preparation of designs, estimates and contract drawings and specifications in connection therewith.

Successful applicants will be required to undergo a medical examination and to become members of the Tyne Commission Superannuation Fund.

Commencing salaries will be fixed according to qualifications and experience.

Applications stating age, education and training, qualifications and experience, accompanied by two recent testimonials, should reach the undersigned not later than 22nd April, 1954.

J. K. McKENDRICK,
Secretary.

Tyne Improvement Commission,
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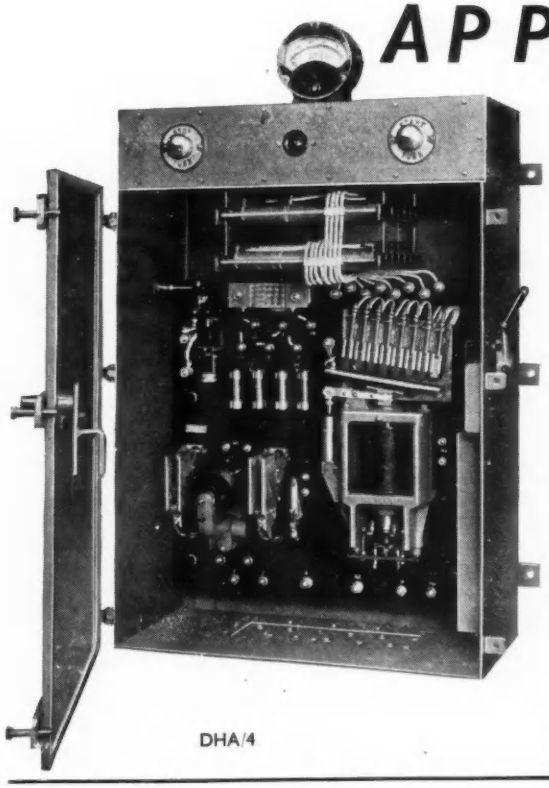

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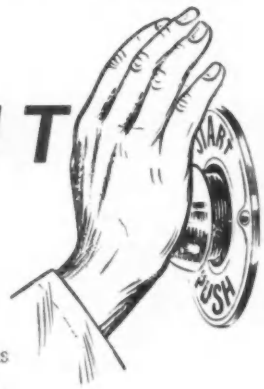

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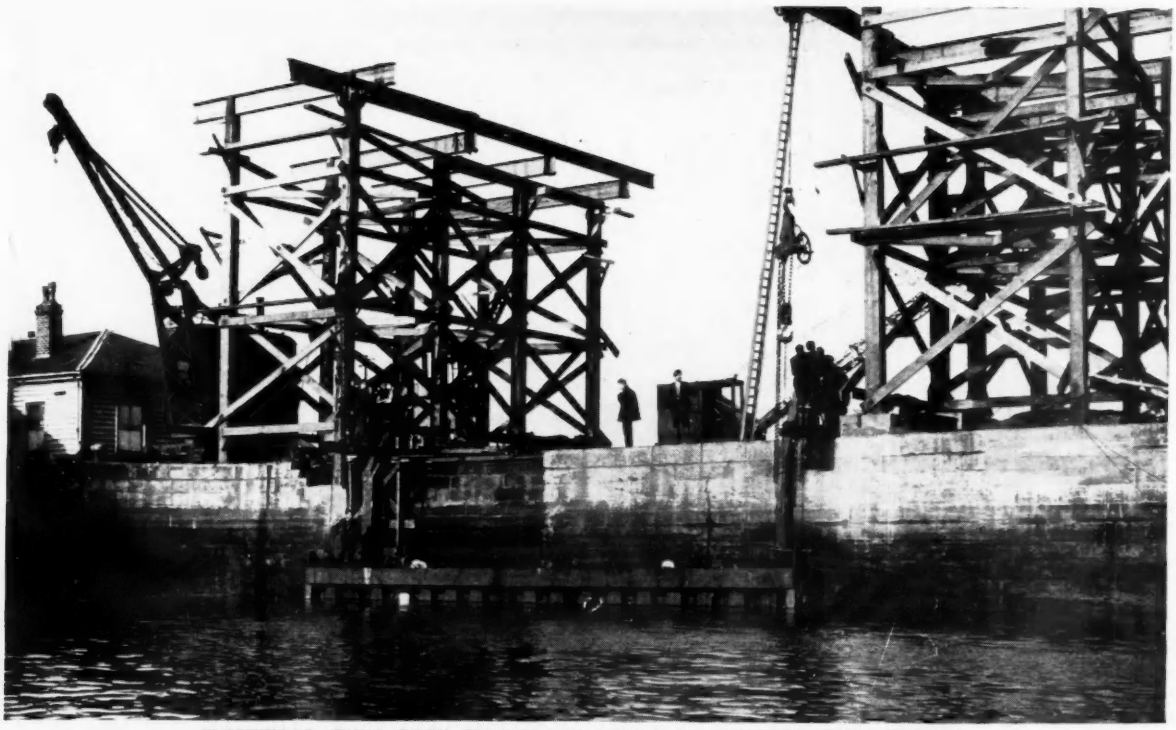

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INDEX TO ADVERTISERS

Abelson & Co. (Engineers) Ltd.	xlii
Allen, Edgar & Co., Ltd.	viii
Anderson-Grice Co., Ltd.	xli
Appleby-Frodingham Steel Company	xi
Arpic Engineering, Ltd.	vi
Arrol, Sir William, & Co., Ltd.	v
Blankevoort Whittaker Ellis, Ltd.	xxxv
Booth, John, & Sons (Bolton) Ltd.	xxxvi
Booth, Joseph & Bros.	xix
Boydell, E. & Co., Ltd.	xiv
British Insulated Callender's Cables Limited	xxii
Broom & Wade, Ltd.	xxx
Butters Brothers & Co., Ltd.	xxv
Buyers' Guide	xl
Chance-Londex Ltd.	xxxviii
Christiani & Nielsen, Ltd.	*Back Cover*
Clyde Crane & Engineering Co.	xix
C. M. Van Rees Wz.	xlii
Cohen, George, Sons and Co. Ltd.	xxiii
Cowans, Sheldon, & Co., Ltd.	viii
Crandall Dry Dock Engineers, Inc.	xlii
Dewhurst & Partners, Ltd.	xxxiii
Docks & Inland Waterways Executive	xxxix
Dredging & Construction Co., Ltd.	xxix
Eagre Construction Co., Ltd.	xxxix
Fairclough, Leonard, Ltd.	xxxiv
Ferguson Brothers, Ltd.	iv
Fleming & Ferguson Ltd.	*Inside Back Cover*
Foamite Limited	xxxii
Fowler, John & Co. (Leeds) Ltd.	vii
Goodyear Industrial Rubber Products	xxvi
Greenheart and Wallaba Timber Co., Inc.	xlii
Gunite Construction Co. Ltd., The	xxxviii
Harbour & General Works, Ltd.	xxxviii
Head, Wrightson & Co., Ltd.	xv
Hughes, F. A. & Co., Ltd.	xxvii
Industrial Trading Corporation "Holland"	xxiv
I.T.D., Ltd.	xxxi
James Contracting & Shipping Co., Ltd.	vii
Jones, E. C. & Son (Brentford Ltd.	xxxv
Kalis, K. L., Sons & Co., Ltd.	xvi
Lind, Peter, & Co., Ltd	xxxiii
Lobnitz & Co., Ltd.	*Back Cover*
Mallinson and Eckersley, Ltd.	xxxvi
Midland Iron Co., Ltd., The	ix
National Coal Board	xxxvii
Nu-Swift, Ltd.	xlii
Port of Long Beach	xx
Priestman Brothers, Ltd.	*Inside Front Cover*
Ransomes, Sims & Jefferies, Ltd.	xxxvii
Russell, George, & Co., Ltd.	xlii
Siebe, Gorman & Co., Ltd.	xxxvi
Simon Handling Engineers Ltd.	x
Simons, William, & Co., Ltd.	xii
Small & Parkes, Ltd.	*Inside Front Cover*
Smith, Thos. & Sons, Ltd.	xiii
Stothert & Pitt, Ltd.	iii
Tilbury Contracting & Dredging Co., Ltd.	xvii
Timber Development Association	xxi
Turton Platts, Geo., & Co., Ltd.	xxxviii
Under Water Sales, Ltd.	xlii
United Steel Companies, Limited, The	xi
Vickers Armstrongs, Ltd.	xxviii
Ward, Thos. W., Ltd.	xviii
Wellman Smith Owen Eng. Corporation, Ltd.	*Inside Back Cover*
Westminster Dredging Co., Ltd.	*Front Cover*
Westwood, Joseph & Co., Ltd.	xxxvi

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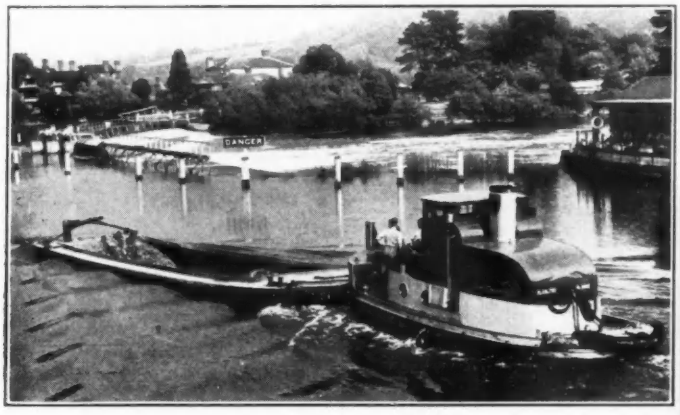

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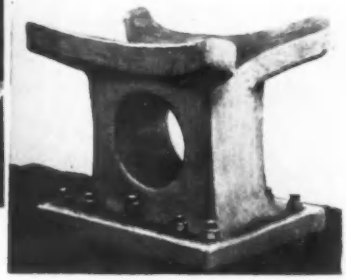

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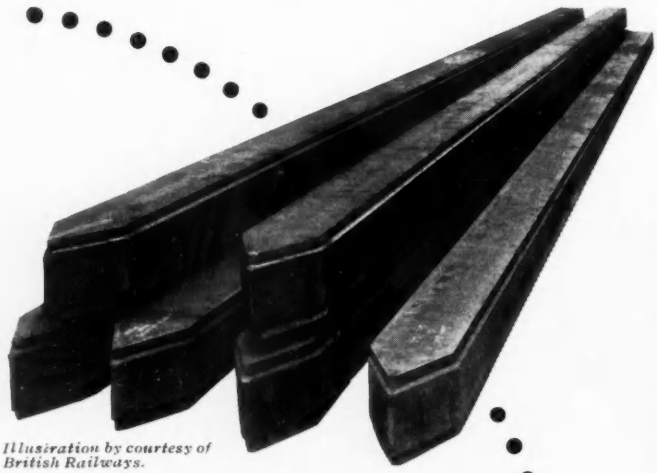

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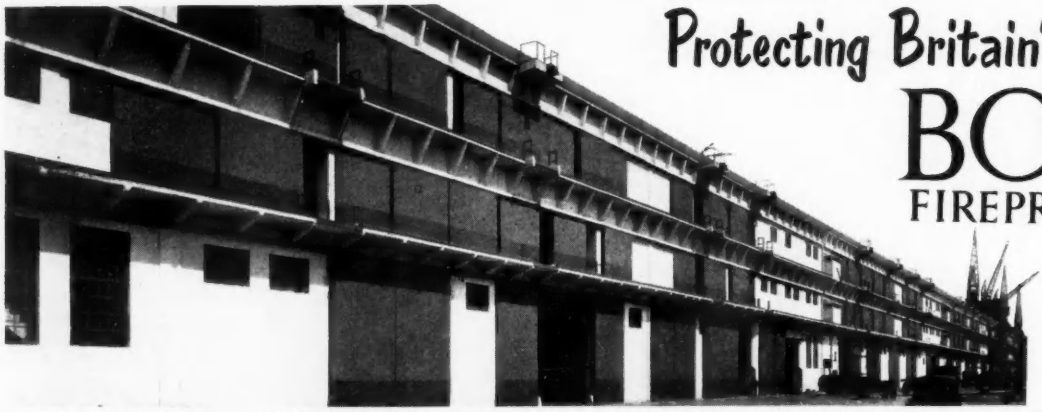

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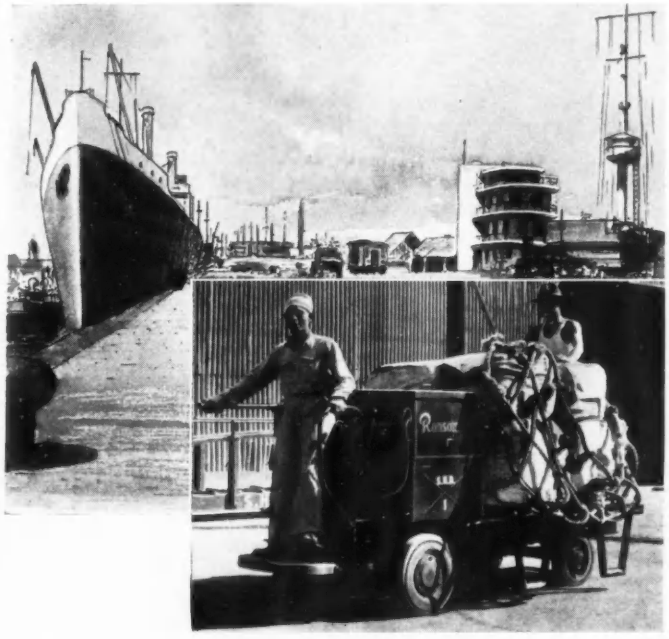

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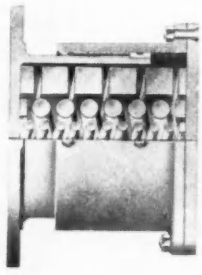

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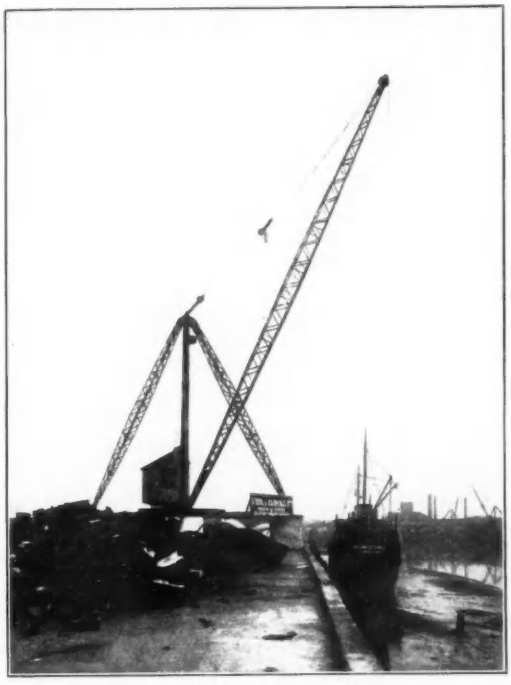

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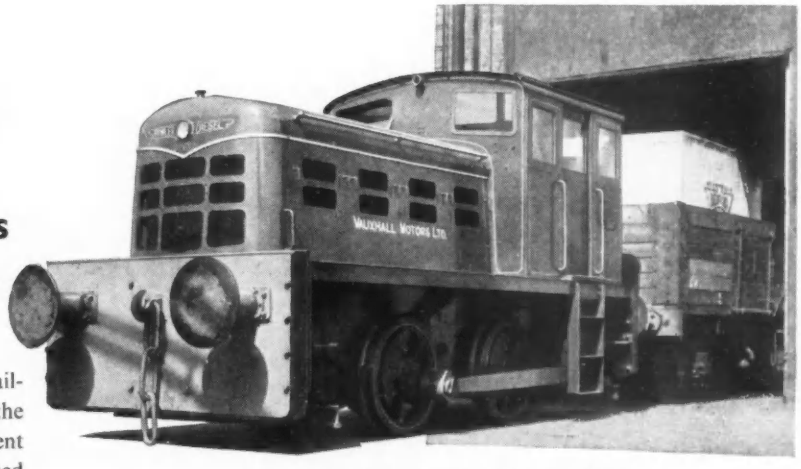

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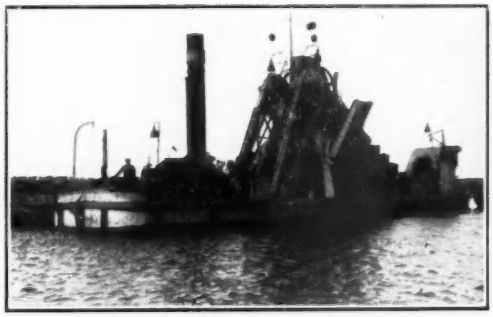

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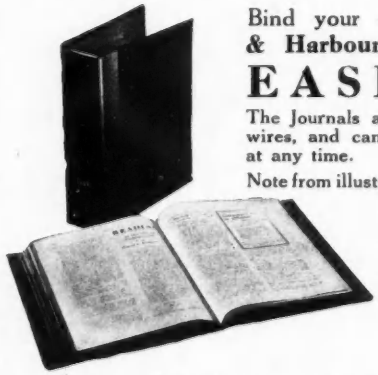

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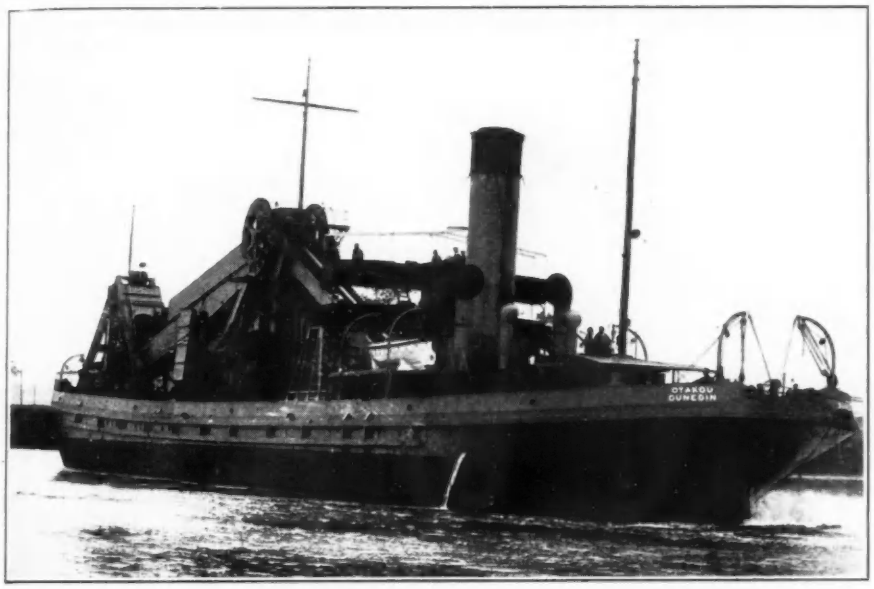

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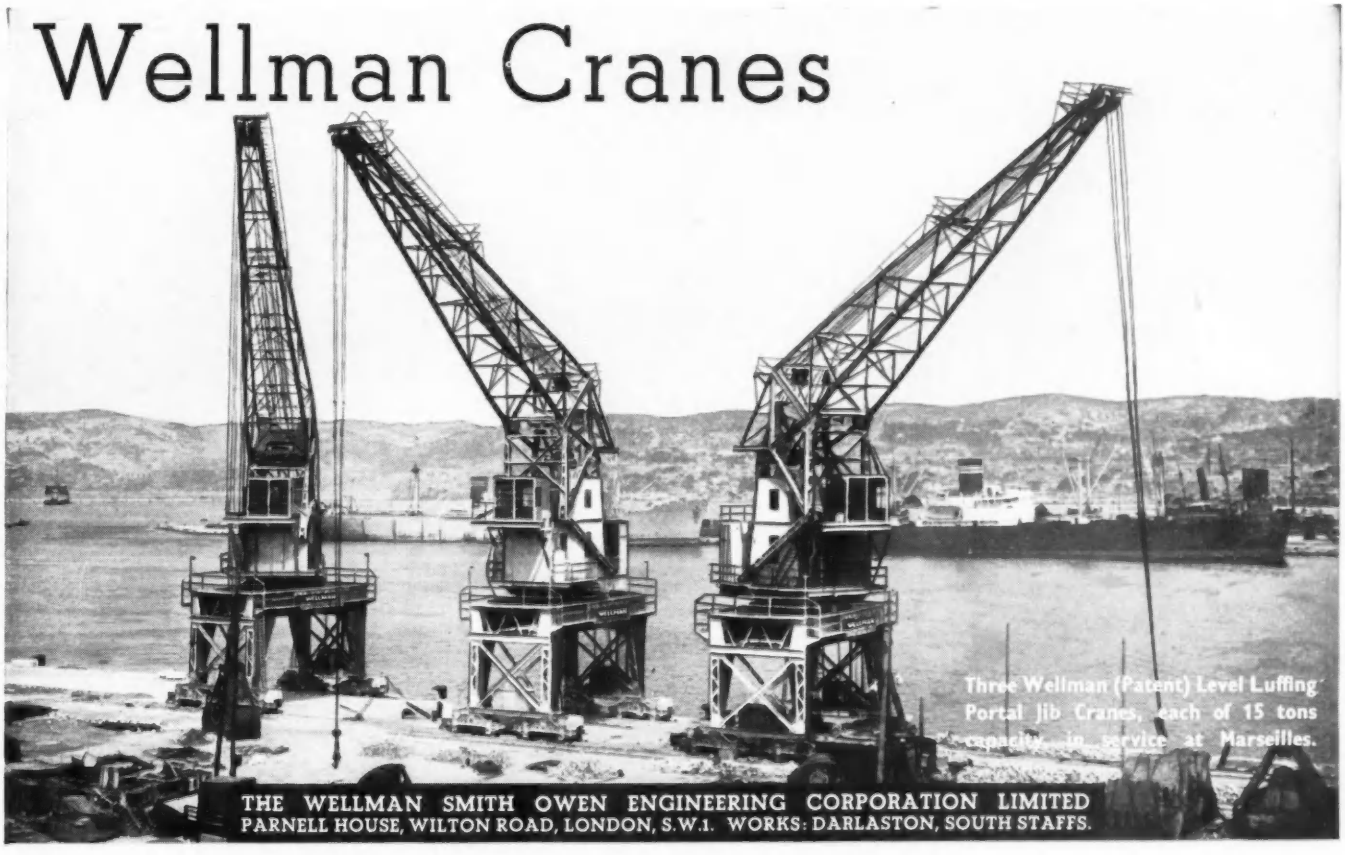

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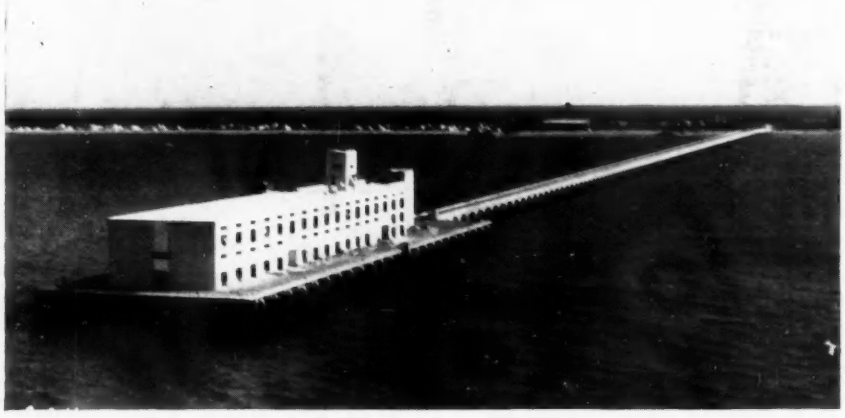

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Printed by Ward & Foxlow, Ltd., and Published by Foxlow Publications, Ltd., at 19, Harcourt Street, London, W.1.